



REPUBLIC OF TANGANYIKA

Annual Report
of the
Ministry of Agriculture
1962

see 44:599

Comprising the following Divisions:

AGRICULTURAL EXTENSION

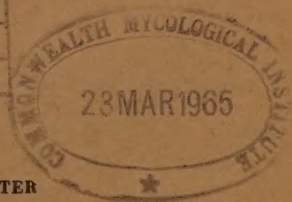
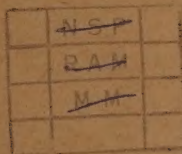
RESEARCH

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1964

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Price Shs. 11/-



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MINISTRY OF AGRICULTURE

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FOREWORD TO ANNUAL REPORT, 1962

Uhuru na Umoja is written on our country's Coat of Arms. This was not by chance, it was carefully considered by our leaders to be a fitting motto for the country and to represent our hopes for the future. It is therefore with pleasure that we of the Ministry of Agriculture present our first consolidated report. For in Agriculture just as in so many other spheres, unity is of prime importance. The year under review is one in which, as well as all its other activities, this Ministry has been engaged on an exercise in Unity. For the first time we have one officer in charge of all Ministerial activities in each Region. The reason for putting emphasis on Unity was not only in order to promote maximum efficiency but also so that our farmers should see that their Ministry was practising what it preached—particularly when we preach the importance of integration of crops and stock in order to develop a sound balanced farming system and to maintain and improve the fertility of our soil. It will be this Ministry's continuing aim to present this integrated approach and to live up to the short but inspiring national motto.

D. N. M. BRYCESON,
Minister for Agriculture

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REPUBLIC OF TANGANYIKA

ANNUAL REPORT OF THE AGRICULTURAL EXTENSION DIVISION, 1962

PART I

SECTION I

INTRODUCTION

An important event in the agricultural year was the re-organization of the Ministry of Agriculture into seven divisions. An Agricultural Extension Division was established as the principal executive and advisory arm of the Ministry throughout the Republic, with responsibility embracing the whole field of practical agriculture in crop and animal husbandry including marketing of plant and animal products.

With the re-organization, the rôle of the Regional Agricultural Officer became more clearly defined. He became the Senior representative of the Ministry in the Region and assumed responsibility for the co-ordination of all Ministerial activities within the Region, working through the Ministerial Co-ordinating Committee.

Turning to production, 1962 showed a marked improvement over the disastrous year of 1961. Weather conditions were generally ideal for plantation crops and there were record crops of sisal, cashew nuts, tea, pyrethrum and wattle extracts. The volume of exports of agricultural products rose by 1.9 per cent over 1961.

Extension staff played a considerable part in assisting with the drawing up, co-ordination and implementation of Village Development Schemes at Village, District and Regional levels. In most villages the enthusiasm and incentives created by these National-building schemes have proved truly invaluable to advisory work.

At the time of writing, £432,680 worth of agricultural credit had been injected into farming (mostly peasant farming) by the Agricultural Credit Agency working through Executive and District Loans Committees. The advisory staff undertook all the administrative and executive responsibilities of the Agency at district level. The response from the farming public has been tremendous in most districts and has provided a telling stimulus to the more receptive and progressive emerging yeomen, farmers, farming associations and producer co-operatives throughout the Republic.

SECTION II

WEATHER

Rainfall during the calendar year was less variable in amount and distribution than that of 1961, and in most areas provided better growing conditions. The general picture was of more than average second rains of the 1961/62 season which, in many areas, continued from October, 1961 to the long rains of 1962. The March/May rains were average to below average. Unlike the previous year the October/December rains of the current season were average, but started late.

In Northern Region rains continued from October, 1961 to the 1962 long rains without a break. The long rains, however, were light, badly distributed and of short duration. In West Lake the exceptionally heavy November/December rains caused several road disruptions and raised the water table in low-lying areas to an unprecedented height including the levels of Lake Victoria and Kagera River. In Eastern Region the same rains prolonged inundation of flood plains of Kilombero/Ruaha/Rufiji, Ruvu and Wami rivers. All districts in Central

Region (the worst famine-hit area in 1961) received much heavier than average rainfall during December, 1961 and January, 1962 resulting in an above average rainfall for the 1961/62 season. The overall effects of these rains were, however, not favourable to an appreciable increase in crop yields due to heavy seed and young plant washings on sandy soils, waterlogging on heavier "mbuga" soils, laying in early planted crops and an abrupt finish of rains in April. At the end of 1962, rainfall in the months of October, November and December was average, providing very satisfactory planting conditions in the Region. For Southern Highlands and Lake Regions the same pattern as above predominated with exceptionally heavy rains at the beginning of the year, average to below average long rains and fairly average, but late, second rains.

The effect of very late long rain after heavy early 1961/62 rains in Western Region was to raise the water table which persisted even during the dry season causing considerable trouble to communications. The 1962/63 rains fell in October on top of an already high water table producing floods which were experienced in the Region early in 1963.

Rainfall figures are given in Appendix I.

SECTION III

MAIN CROPS

Crop production figures or amounts of crops marketed are given in Appendix II and exports from Tanganyika in Appendix III. For crops such as sisal, coffee, cotton, tea and pyrethrum, there are properly organized markets and the figures can be given with confidence of their accuracy. With crops such as maize, sorghum, groundnuts, etc., much is locally consumed or sold outside recognized markets so that figures are merely estimates.

SISAL

The importance of sisal to Tanganyika is again shown by the export value of £15,734,144 for 1962, i.e. 42 per cent of the agricultural export value of the country. The quantity exported was 219,519 tons, an increase of 18,610 tons over the 1961 figure. This was a new record crop after the 1959 export record of 208,767 tons. Part of the increased production was obtained from increased acreages, part by better husbandry, e.g., use of manure, fertilizers, sisal waste, better spacings, use of leguminous cover crops and in the latter part of the year enhanced prices which brought neglected fields into economic production.

Last year the prices of sisal showed a downward trend but 1962 has seen the position reversed with prices for Grade I fibre climbing to some £125 per ton towards the end of the year.

A number of farmer co-operative groups and Farming Associations showed great interest in sisal growing during the year. In Tanga Region about ten groups cleared land to plant small acreages. One such group received a loan of £2,300 from Agricultural Credit Agency for clearing and had, by the year end, planted approximately 60 acres. In Eastern Region Kimamba Farmers' Union planned a 1,000-acre project.

There was considerable labour unrest and several strikes in the industry, but all sorted themselves out and, assisted by the new Wages Act, the industry was running smoothly by the end of the year. A 5 per cent *ad valorem* levy on sisal export was promulgated during the year.

Bulking of hybrid 11,648 continued. Superiority in yields over the conventional sisal was observed in almost all the estates where the hybrid was grown for investigation under different soil and climatic conditions. However, the hybrid has not been the success hoped for as the type has developed diseases not previously reported as serious on *Agave sisalana*.

Interest in hedge sisal in Lake Region was maintained and production estimated at 13,000 tons of hand-decorticated fibre was produced, 2,500 tons less than the 1961 figure. An increase in amount marketed occurred during the period January/July but the start of the cotton season caused the usual seasonal drop in production and sales in the period September/December never reached the usual 1,000-1,500 tons per month. The affiliate unions of Victoria Federation of Co-operative Union Limited, assisted by T.A.S.M.A., took over the monopoly buying of hedge sisal fibre with effect from November.

COFFEE

Total export of clean coffee amounted to 25,668 tons valued at £6,575,252 as compared with 24,615 tons in 1961. Under the new Coffee Industry Ordinance the Coffee Board of Tanganyika took over the sales of coffee from 1st October, 1962 and was thus empowered to exercise control over the movement of all coffee grown in Tanganyika from the plantation to the sale room. The Board has already made enormous progress in initial arrangements aimed at relating production to the obligations accepted under the International Coffee Agreement.

(a) *Mild Coffee*

Total production of milds was 16,431 tons compared with 13,670 tons in 1961. Quality improvement, rather than total increase of production by new planting, was the policy directive throughout the Republic. New planting of Arabica was only supported—

- (a) where increased production was necessary to support central pulperies,
- AND (b) where conditions were favourable for production of high quality coffee,
- AND (c) where there was no other cash crop which could be grown as profitable.

Intensified cultural and quality practices, such as erection of central pulperies, improved cultivations, pruning, mulching, use of insecticides and fungicides, nurseries work and replanting became the main aim of the Extension staff.

In the Northern Region plans were drawn up for construction of central pulperies in Akheri, Mwika, Kirua, Lyamungu and Masama. Ngani planned to enlarge its pulperies and Koimeru set a target for 4 pulperies in 1963. Clubs similar to "Nremi Bora" were formed in Kilimanjaro district with the aim of marketing their crop under their own mark. In Southern Highlands over 80 small washing channels were installed. Nineteen sites were selected for central pulperies in Rungwe district and subsequently approved by an expert from Lyamungu.

1962 saw beginning of a systematic use of insecticides and fungicides in Northern Region. Aldrin was replaced by the more recently recommended Diptrex in the fight against antestia. The copper demonstration/observational trials launched in Northern Region resulted to an increase usage of the insecticides. It is reported that about 10 per cent of the African coffee received copper treatment during the year. In Meru insecticides and fungicides were made available by societies at highly subsidized prices. In Southern Highlands response to the teachings of improved cultural methods, pests and diseases control were particularly marked in the Mbozi area where farmers began copper spraying and fertilizer applications on their coffee holdings.

As a pre-requisite to effective disease and pest control, pruning campaigns were held throughout important coffee growing areas. Courses on pruning for junior field staff and farmers were held continuously and wherever possible coffee stations provided seasonal instructions on pruning.

Although new plantings were not encouraged, there was need in all coffee growing areas for an adequate supply of good Arabica seedlings to replace the unproductive trees. The importance of proper establishment of transplants in the way of spacings, good holes, incorporation of F.Y.M., mulching, etc., were emphasized in all areas as essential to future performance of good seedlings from good nurseries. In Kilimanjaro total seedling production fell from half a million to 170,000 when the K.N.C.U. handed over nursery practices to individual societies. It is reported that K.N.C.U. will resume the responsibility for production in 1963. Elsewhere no serious fall in seedling production occurred during the year.

(b) *Hard Coffee*

The total production was 10,569 tons of clean coffee as compared with 6,234 tons in 1961. The average price paid to growers of Robusta f.a.q. in Bukoba was £145 per ton which was £20 per ton higher than in the 1961 season. Arabica f.a.q. in Bukoba averaged at £229 per ton, £7 per ton less than in 1961.

For the first time, since the record crop of 1957, production in West Lake Region just fell short of the 10,000 tons mark. Production was 9,769 tons compared to 10,200 tons record of 1957.

Hard coffee prices remained fairly steady throughout the year and, contrary to expectations, Robusta prices hardened with the consequent benefit to the Region. There was, however, an overall weakening of Arabica prices as compared with 1961 prices.

In pursuance of a Ministerial directive on coffee policy, no encouragement was given in the field to increased Robusta production by new planting.

Throughout the coffee growing areas, the aims were directed to quality improvements. In West Lake emphasis was placed on the uprooting of old unproductive trees and replanted with Arabica, rejuvenation by severe pruning and trials in pulping. Some considerable success in replanting campaign was marked in two small areas of Bukoba. Elsewhere in the country either most nurseries closed down or remained with unused stocks of seedlings, indicating a falling-off in interest among the farmers concerned. In North Mara in sharp contrast, seedling requirements were in excess of stocks available.

In West Lake insect attack and disease was generally less severe than in the previous year. In Ngara over 500,000 trees were sprayed with Aldrin against antestia. In Bukoba/Karagwe B.N.C.U., in co-operation with the Division, continued to supply spraying services.

Percentage of U.G. and defectives were lower during 1962 crop season than in 1961 as a result of both deliberate modifications in the Bukoba factory and favourable conditions in the field. 90 per cent of Arabica and 83 per cent of Robusta reached f.a.q. standard in the Government coffee grading, as compared with 89 per cent of Arabica and 67.5 per cent of Robusta in 1961. The comparative figures for the defectives fell by slightly over 1 per cent of Arabica and 0.1 per cent of the Robusta. Three small pulperies were built each in Ngara, Karagwe and Bukoba during the year. A total of 6,171 lb. of parchment consignment produced was placed on the market to ascertain price differential between hard coffee and Bukoba milds.

COTTON

At the time of writing, all figures for cotton production had not been received due to disrupted communications, but it is highly likely that production in 1962 reached a new record figure estimated at 210,000 bales compared with last year's total production of 167,511 bales. Of 210,000 bales, some 195,000 bales were produced in the Lake Region compared with 160,000 bales in 1961. Several areas contributed to this year's increase in production. In the Lake Region there was an estimated 30 per cent increase in the cotton acreages planted. Most of Sukumaland south ginnery zones had record crops. Mhumze zone increased production from 7,000 bales in 1961 to 18,000 bales this year. Record crops were also achieved in Biharamulo, West Lake; "Mlao" crop in Rufiji, Ulaya and Ukutu, Eastern Region.

In West Lake production increased by 379 bales over 1961 crop, mainly due to increased acreage cultivated by the Wasukuma moving into the Lake shore area. "Mlao" crop was estimated to top 10,000 bales. To cope with this exceptional harvest additional gins had to be installed in the ginneries and a labour force (volunteers) moved in from Dar es Salaam to help pick the tail crop. In Ulaya and Ukutu increased yields were largely a result of early plantings and use of insecticides. Yields of up to 2,000 lb./acre were achieved in Ukutu and Ulaya. The average production per co-operative member in the I.P.P. Ulaya area rose to 1,447 lb. In Nzega district production increased from 2,887 bales in 1961 to 3,909 bales due largely to increased acreage planted.

Some areas presented rather a gloomy picture. In Northern Region production was only about a third of 1961 crop attributed largely to delay in uprooting and burning of the 1961 crop including poor rains which led to late planting. The Bukoba/Karagwe crop was uneconomic and future planting is to be discouraged in the light of trials conducted in the areas. Kigoma crop was 230 bales, slightly lower than the 1961 crop. In Tanga Region no major enthusiasm was indicated and a small crop produced was marketed at ginnery buying posts.

Transport of crop to markets and seeds to growers continued to remain a serious challenge to the efficiency of the industry. In the Lake Region uncontrollable disruption in communications was appalling during 1961/62 rains. Unseasonal September/November rain increased the difficulties and seed cotton approximately the equivalent of 6,000 bales remained in buying post stores awaiting transport to ginneries by the end of the year. It was reported that only team spirit of highest order between L.S.M.B. officials, ginnery

organizations and extension staff at all levels managed to effect, without a major hitch, the movement and dusting of seed for planting 1962/63 cotton season. 13,000 tons of this seed was dusted and moved from the five producing ginneries to the 500 odd cotton seed stores in the cotton growing areas of the Lake, West Lake, Central and Western Regions. Despite distances involved, disrupted communications and transport systems, all cotton growers had sufficient seed available for their needs within the recommended planting period. In Eastern Region disrupted communications delayed supply of seed to a few inaccessible areas. The unprecedented rise of Lake Victoria placed much of the main cotton transport route in Biharamulo under water and a re-alignment of the road from Nyamirembe to Buzirayombo with self-help labour and financial assistance from L.S.M.B. was necessary. Without this help marketing of the Biharamulo cotton crop would have been much delayed.

Standards of grading varied considerably. Grades of several zones in the Lake Region were below the selling type. Heavy claims were therefore paid by the Board for these poor deliveries. Geita, Nyambiti, Manawa and Bukumbi in general delivered particularly low grades. Sukumaland South had reasonably high grade deliveries. Most of low grades resulted from dull and rain-stained crop due to late planting and late harvesting of tail crops. Harvesting was again noted to be very incomplete in several areas.

Agricultural extension staff continued to preach early planting and weeding and the use of insecticides. The use of manure and fertilizers was only encouraged in the Western cotton growing area. Encouraging responses were noted in many cotton growing areas, more so as the extension staff had strong support from the Area Development Committees and Village Development Committees. Use of flannel-graphs as an aid to extension was particularly successful in Kilimanjaro area.

Demand for seed remained high and in Lake Region alone 11,642 tons of seed were issued to growers. Larger coverage of improved seed strains was achieved during the current year than last year. Briefly, in Lake Region Ushashi, Mugango, Kibara and Ukerewe (mainland) zones were issued with U.K. 58. U.K. 55 was issued in Mhunze and Usogore zones. The remaining zones in the Lake, West Lake and Western Regions received U.K. 51. With the exception of the Bukumbi and Ihale zones, which are using up the remaining U.K. 51 seed, the other zones in the Lake Region received the new U.K. 55 (in the south) or the new U.K. 58 (in the north) cotton seed for planting the 1962/63 crop. Approximately 5 tons of new U.K. 61 are being bulked up in the Kabainza area (Ukerewe mainland). All cotton areas of Eastern Region received I.L. 58 except Bagamoyo and Rufiji which areas continued with the 47/10 strain. Northern Region and Same had B.P. 52.

Lateness in uprooting and burning of crop residues in the previous season is reported to have caused further build-up of pink bollworm in Kibara, Nassa and Nyambiti zones. Capsid and spiny bollworm caused immense damage to Geita crop. A Fusarium wilt survey, started in 1959, continued during 1962 in the Lake Region. Further spread inland from Lake shore areas of Geita was confirmed and new outbreaks were reported and confirmed in Mwanza, Ukerewe and Ushashi.

Basic price to growers in the Lake Region was 59 cents per lb. for Grade A and 25 cents per lb. for Grade C, this amount being increased in each case by 7 cents to co-operative societies when they delivered seed cotton to ginneries. The Grade A figure was, of course, subject to various cesses deductible in the Lake Region. Comparable prices were paid to the coastal areas with adjustments to cover extra ginning costs and other local charges including small deductions for transport on long hauls. A token *ex gratia* payment was recommended for Rufiji ginneries to compensate them in part for the low ginning out-turn suffered on variety 47/10.

CASHEW NUTS

Cashew nut production continued to increase rapidly in Southern Region and quite reasonable increases over the 1961 crop were obtained in Tanga and Eastern Regions. Of the 55,000 tons estimated production, 46,578 tons were produced in Southern Region. Total export from Tanganyika reached a new record figure of 59,013 tons valued at £2,335,273 as compared with 39,962 tons in 1961 valued at £1,804,973.

Early clearings of orchards in Southern Region resulted in fewer fire incidences than normally recorded. Several farmers received loans from Agricultural Credit Agency for this vital work.

The Southern Region Cashew nut Board was formed during the year and took over the marketing of entire crop in October. Prices on the overseas markets were favourable throughout the season and the Board was thus enabled to continue paying the same prices at close of season as those promulgated at the beginning of the season.

As in the previous season there were no organized and stable markets for cashew nut in Tanga and Eastern Regions. A start was made in Rufiji and Kisarawe in co-operative marketing and nuts were delivered to COSATA, Dar es Salaam.

Most Village Development Committees in the coastal areas had plans for increasing cashew production and, as some of the plans are already being implemented, a steady increase in tonnage is anticipated.

Helopeltis damage, which is frequently heavy, was not so much in evidence this season.

CASSAVA AND SWEET POTATOES

Reserves of these root crops proved exceedingly invaluable in areas where other food crops were in short supply. Several Village Development Committees set production targets for these two crops as an anti-famine measure. Although most of these crops are only consumed locally, or merely change hands in the areas of production, dry cassava is becoming a valuable item for cash and a surplus for export was estimated at 23,100 tons, mainly from Western, Southern and Lake Regions. The virus resistant variety 46106/27 in Tanga is now firmly established and can be seen as pure stands along the coastal belt. Cuttings of the variety were transported as far afield as Monduli, Tengeru, Lushoto, Same and Masai to reduce the risk of food shortages in the areas. 11,048 tons of cassava flour were exported valued at £19,582 compared with 17,658 tons in 1961.

COCONUT, COPRA AND COIR

The most important producing areas remained Tanga, Eastern and Southern Regions. In Tanga copra production fell from the normal 4,000 tons to 2,840 tons due mainly to competition with the whole-nut industry. A new sun-drying device produced good grade of copra in 5-6 days. Such a sample was sent to the United Kingdom and fetched a £2 premium per ton over F.A.Q. prices. In Eastern Region copra production was estimated at 3,000 tons. Total copra exported was only 50 tons valued at £2,250.

Coir production in Tanga dropped due to fall in prices from £43 per ton last year to £28 this year. Of nine factories built for this trade, only one remained in production by the end of the year. A factory owner in Tanga produced a machine for manufacturing coir twine.

Production in Southern Region remained low. A survey conducted in Lindi district showed that the five soap factories in the area were mainly using imported copra oil from Mozambique and Dar es Salaam, thus indicating a shortage of local raw material. Coconut production per tree in Lindi was at the average of 10-15 nuts, a very low average compared to other areas.

Seedling nurseries were maintained in Tanga, Southern and Eastern coastal districts. Demand in Tanga, where seedlings sold at -/50, was very low, whilst 12,000 seedlings were issued free in the Eastern Region coastal districts.

MAIZE, SORGHUM AND MILLETS

(a) Maize

Crops were good in Iringa, Kilimanjaro, Arusha, Karagwe, North Mara and Geita Districts and fair to poor elsewhere. In Southern Highlands yields in all districts except Iringa were affected by rain and production was below average. A surplus estimated at 14,000 tons was maintained in Iringa district. Although the Northern Region main planting season suffered from drought and insect pests including Longhorn Grasshopper, shield bugs and stalk borer, overall production was fair and had an estimated Regional surplus of 8,000 tons. Despite higher rainfall than average in Central Region, production was lower than expected. Total amount sold in the whole country was estimated at 71,800 tons compared with 50,500 last year. 19,147 tons of whole maize, maize meal and flour valued at £325,510 were exported from Tanganyika during the year.

(b) *Sorghum*

The crop was generally poor in the main growing areas owing to the excessive 1961/62 rains which caused flooding and water-logging. In all 6,539 tons were marketed compared with 7,114 tons in 1961.

(c) *Bulrush Millet*

Bulrush millet (*Pennisetum typhoideum*) was grown widely in Lake and Central Regions, but suffered excessive rains and water-logging as sorghum above.

(d) *Finger Millet*

Finger millet (*Eleusine sp.*) was grown widely in Eastern Region, Kilimanjaro, Ufipa, Kasulu, Kibondo, Karagwe and in most parts of Southern Highlands Region. It is a crop which flourishes best under good soil fertility conditions and ample rainfall and the rainfall last year was ideal for the crop. Millet is used extensively for food and local "beer".

OIL SEEDS

(a) *Castor*

Production was estimated 10,000 tons as compared with 12,000 tons last year. Actual export during the year amounted to 13,448 tons valued at £598,667 compared with 10,749 tons in 1961.

Castor production remained largely a back-yard crop with very few large fields. In Central Region production was estimated at 4,400 tons, 1,000 tons more than last year; half of this amount was produced in Mpwapwa district. In Tanga Region only Handeni produced any significant amount estimated at 140 tons. Morogoro and Kilosa together produced 1,000 tons, which amount was less than last year's due to insect attack from mirids and capsids. In West Lake 15 tons were produced from Biharamulo, other districts being deterred by lack of suitable marketing facilities. Elsewhere in the Republic production was on small scale scattered all over.

(b) *Groundnuts*

Groundnut was above expected production in the Western, Lake and Central Regions, the main producing areas. In Lake Region marketed production amounted to some 1,100 tons valued at £82,060 compared with 200 tons last year, exportable surplus having doubled in Shinyanga. Spacing remained poor throughout Lake; difficult to improve as much of the crop is grown interplanted with maize and other crops. Central Region also had relatively good surplus with over 4,400 tons passing through local produce markets compared with 1,100 tons in 1961. Dodoma district produced a surplus of 284 tons as compared with only 12 tons last year and Iramba district sold 800 tons more than in 1961. In all 6,414 tons were exported valued at £393,171 as compared with 3,442 tons last year valued at £232,158. Total production was estimated at 28,700 tons of which 16,500 tons passed through markets.

(c) *Sesame*

Morada continue to maintain its popularity but where grown in areas suitable for cotton, it failed to compete with latter in terms of returns per acre. Lake, Southern and Eastern Regions remained the most important areas for the crop. Production in Southern Region amounted to some 7,000 tons and fetched particularly good prices due to some traders over-estimating the production and making forward contracts in excess of quantities available. Flea beetle incidence was less severe in Southern Region. In Eastern, production amounted to 1,100 tons, 100 tons less than in previous year due to late planting and water-logging. In Lake the crop was produced in North Mara, Musoma, Ukerewe and Geita. Musoma and North Mara together produced 220 tons. In Tanga Morada was a complete failure, having developed leaf distortions; Venezuela 51 will be tried next season. Total production was 8,640 tons compared with 7,540 tons in 1961.

(d) *Sunflower*

11,843 tons were exported worth £352,648 compared with 10,672 tons in 1961 worth £333,522. Average price paid to growers was only -/20 per kilo and consequently many areas lost interest in the crop. Central and Southern Regions had an estimated production of 1,890 and 1,000 tons respectively.

(e) *Trichilia emitica* (*Mafura nut*)

This nut oil is gathered from indigenous trees and is only important in Rungwe District for sale to a local soap factory. 67 tons were marketed in Rungwe District at -/22 per kilo as compared with 550 tons last year.

PADDY

Weather conditions were generally very suitable for paddy production in all growing areas and bumper crops were obtained throughout. There was an estimated total production of some 79,000 tons of which 39,520 tons was marketed compared with 22,940 tons in 1961. Lake and Western Regions together marketed some 31,100 tons. In the Lake Region marketing was steady throughout the season and the affiliated Unions of V.F.C.U. were granted the primary market buying monopoly as at August, 1962. Prices to growers varied from -/25 to -/35 per lb. depending on variety and quality. In Eastern Region some flooding reduced yields and Regional production was estimated at 6,000 tons compared with 11,000 tons last year. Crops planted in the flood plains of the Rufiji, Wami and Ruvu were destroyed by floods. Afaa variety fetched better prices than Borakupata, but less than Surinam grown on estates in Kilombero.

PULSES

Various pulses are grown in Tanganyika, mainly for subsistence and also for sale. These include mixed beans, peas, chickpea, cowpea, soya bean and pigeon pea. Chickpea, soya and haricot beans are grown mostly for sale. The most important areas of production are Northern and Southern Highlands Regions, but production in other Regions continued to increase particularly in Southern and Lake Regions. Estimated total production was 123,000 tons of which 19,600 tons were marketed. In Northern Region bonavist bean, did reasonably well with 1,000 tons available for export some of which went to Italy. 900 tons of pigeon pea surplus was produced in Arusha. Production figures for beans, cowpea and field peas in Southern Highlands were 600 tons, 85 tons and 1,080 tons respectively selling at average price of -/55 cents each per kilo.

PYRETHRUM

Pyrethrum is grown only in Southern Highlands and Northern Regions by licensed individuals and co-operative societies. 1,886 tons dried flowers was produced during the year as compared with 1,274 tons in 1961.

In Southern Highlands Region pyrethrum is becoming a crop of really major importance. From 9 tons produced by local farmers in 1957, when the campaign for increased African production was launched, production has leapt to an estimated production of 1,050 tons in 1962. The total licensed acreage in the Region for 1961/62 season amounted to over 20,500 acres and licensed production to 1,200 tons. While Njombe district remained the main producing area, rapid progress is being made in Iringa district and in Mporotos Highlands of Mbeya district. During the year five new areas were approved for pyrethrum cultivation, i.e., Mapogoro, Lupila, Kipengere, Ilemba and Santilya.

In Northern Region acreages of pyrethrum licensed for the period July, 1962 to June, 1963 totalled 5,898 acres made up of 3,036 by individuals and 2,862 acres by co-operatives. Comparable figure for 1961/62 season were 3,317 acres by individuals and 1,497 by co-operatives. As can be seen the acreages planted by co-operatives has increased considerably. Despite severe weather, excessive rains of 1961/62, pests and diseases including leaf eel worm, root eel worm, root rot, Red Spider, Mite and thrips, progress was made in the Kilinga Glade of Arusha district and the estimated target of 34 tons was reached. A satisfactory increase in pyrethrum planting took place in the Olkokola area of Arusha and steady progress continued at Mwandet. New forest glades were made available at Olgilai, Kitakuu in Arusha and Kibongoto in Kilimanjaro districts. A start was made in a re-forestation-cum-pyrethrum project in a 50-acre forest block at Usseri. Mbulu production remained small at 12 tons compared with 4 tons last year.

In Southern Highlands Region pyrethrins content ranged from 0.90 to 1.66 with low figures common with the crop grown on marginal areas in Iringa district. Average prices paid remained steady at 3/- per lb. of 1.5 per cent pyrethrins content during most part of the year, but fell to 2/90 per lb. towards the end of the year. Diseases and pests remained relatively minor except for occasional incidences of thrips and Remularia bud disease. In the Southern Highlands Region pyrethrins content was generally low, which aspect is receiving attention from the Research Division in conjunction with Extension Division. A fungal disease, *Mycosphaerella* sp., was identified for the first time in a number of areas.

The Tanganyika pyrethrum crop is now purchased by the Tanganyika Extract Company and processed at the new factory in Arusha, opened towards the end of the year. During the year the Tanganyika Extract Company met with extraction difficulties of Southern Highlands grown crop, there being a big difference between the laboratory extraction samples

and the percentage extraction results obtained at Arusha factory. In co-operation with the Extract Factory, this matter is being actively pursued in order to improve the drying of flowers by growers, quick handling by the Societies and to effect speedy transport from the societies to the factory.

Nursery work, multiplications and bulking up of seedlings including search for better strains were actively pursued in all producing areas throughout the year.

SEED BEANS AND SEED PEAS

(a) *Seed Beans*

The Seed bean crop was more than double that of 1961 in the Northern Region, the main producing area, and the quality was good. 5,160 tons valued at £516,000 were exported from the region. Acreage planted increased by 3,387 over last year and the actual acreage grown on sub-contract by local farmers totalled 6,728 as compared with 3,225 acres in 1961. There was negligible amount produced from the Southern Highlands Region.

(b) *Seed Peas*

This small industry has made little progress during the course of the last five years in the Dabaga area of Iringa district. The Highland Seed Company had monopoly over production and marketing and seed for multiplication was only issued to individuals on the basis of signed contracts. During the year Uzungwa Co-operative Society was formed to protect the interest of individuals and effect stronger negotiations with the Seed Company. An estimated 500 tons were marketed of which the Seed Company purchased some 250 tons at 74/- per bag of 200 lb.

SUGAR

Total production of refined sugar was 39,221 tons compared with 28,719 tons in 1961. Most of the production is consumed locally, there was only 91 tons of sugar and jaggery exported valued at £3,099.

Production in Northern Region totalled 26,766 tons of which 24,166 tons was produced at Arusha Chini and 2,600 tons at Karangai. Factory capacity at Tanganyika Planting Company was a limiting factor during the year and new machinery will now have to be installed. The water situation was much better than in 1961. The Company continued their trials with overhead irrigation but are not yet satisfied, furrow irrigation will continue to be the main method of irrigation.

As anticipated the Kilombero Sugar Company started production in August with initial output of 100 tons of grade I sugar per day. About 10,000 tons were produced by the company during the year. The company bought cane from outside growers at 40/- per ton and some 15,000 tons were thus delivered to the factory. Cane growing was maintained very satisfactorily but harvesting caused some difficulty, the fields had to be set on fire prior to harvesting.

Mtibwa Estate (Turiani) and Purshottam Estate (Ruvu) did not come into production during the year. On both estates areas of cane were destroyed by fire and difficulties with the factory have delayed progress.

Production at Bhagwant Sugar Estate in Bukoba district rose from the 1961 figure of 2,006 tons to 2,455 tons.

Cane smut, which broke out at Bhagwant Estate, was fairly controlled during the year. Seven new varieties were sent to Bhagwat from Tengeru for observational purposes.

In West Lake, there was an attempt to interest local farmers with the object of planting cane and selling to the Estate and discussions were in progress during the end of the year to draw up a workable scheme.

Jaggery production was maintained around the 2,000 tons level from processors in Kilosa, Morogoro and Ulanga, the main market being the Central Region.

TOBACCO

The heavy rains of 1961/62 were most unfortunate for tobacco industry and lower yields than those of 1961 were recorded in almost all the important growing areas.

(a) *Flue Cured*

Total production dropped from 3,635,613 lb. in 1961 to 2,488,523 lb. this year, almost all of which was produced in Southern Highlands and Western Regions.

In Western Region the early and relatively heavy rains at the end of 1961 restricted root development and subsequent growth and the later rains adversely affected quality. The total crop just topped 800,000 lb. The Iringa flue-cured crop suffered the same fate from the weather. Growth of the plants was badly inhibited and flowering at 2-feet height was a common sight. Production of leaf this season amounted to 1,634,539 lb. as compared to 2,296,643 lb. of leaf last year, leaving a shortfall of over 1,000,000 lb. of tobacco leaf on the quota of 2.7 million pounds given to Iringa.

(b) *Fire Cured*

Total production dropped from 2,287,040 lb. in 1961 to 1,359,880. Production was confined to Southern, Western and West Lake Regions, although trials were conducted in a few other areas.

Growing conditions throughout were fair, the excessive rains having had less damaging effect on this crop than it did on the Virginia and Turkish crops. Nyamirembe Board sold 250,000 lb. This was more than twice the previous year's crop and there was evidence that a lot more was sold as coil and snuff. Biharamulo, West Lake, topped 25 tons, more than 15 tons over last year's production. Traditional coil markets of Burundi and Ruanda were closed down and growers in Biharamulo and Ngara, who had 3 tons, sold most of it through Nyamirembe Native Tobacco Board.

Sales in Southern Region amounted to 730,589 lb. and it was disposed of as follows:—

Noakes, U.K.	...	...	...	236,403 lb.
E.A.T. Co.	...	...	...	23,574 lb.
Koch, Rotterdam	...	...	...	428,427 lb.
Local	...	...	...	42,175 lb.
Total				730,579 lb.

Effect of weather was rather deleterious on the Southern Region's crop. Planting was delayed and many nurseries in river valleys were destroyed by flooding.

Some problems arose over the fire-cured tobacco crop of Biharamulo and Kibondo due to fumigation troubles. The crop was fumigated against *lassioderma* at the Nyamirembe Board factory at Biharamulo, but the job was not properly done and had to be redone. Finally, yet a third fumigation had to be done when the crop of 260,000 lb. reached the E.A.T. factory at Kampala. Further shipment was stopped and tobacco stored at the Board's Godown in Biharamulo still remained to be sent to Kampala at the year end.

(c) *Aromatic*

Total production increased from 30,790 lb. last year to some 34,603 lb. this year. Western, Southern Highlands and Central Regions remained the main producing areas.

In the Western Region 569 growers actually planted 104 acres, but it was reported that quite a number of people failed to harvest their shambas. The final crop in the Region was 20,350 lb. which fetched an average price of Shs. 2/24 per lb. In Southern Highlands the crop is still in its infancy. However, this season's production was more than double that of last year, having increased from 3,272 lb. of leaf to 10,272 lb. this year. In Central Region a total of 3,503 lb. of cured tobacco was produced by 42 growers, a slight increase over 1961 crop of 3,472 lb. Mr. Waller of the Tobacco Development Company of Africa purchased all the crop offered in the Central and Southern Highlands Regions at average prices of Shs. 2/42 and Shs. 2/36 per lb. respectively with grade A2 fetching Shs. 3/80 per lb. in both places.

WATTLE

The total export from Tanganyika was 8,060 tons of wattle extract valued £390,192 and 1,329 tons of wattle bark valued at £22,020. Comparable exports in 1961 were 7,452 tons of wattle extract and 1,704 tons of wattle bark. Southern Highlands and Tanga Regions were the main producing areas. Wattle bark is also produced in small amounts in Moshi, Arusha and Pare.

In Tanga production of extract rose from 530 tons last year to 1,518 tons this year. A factory with a throughput of 4,000 tons per annum failed to secure enough bark for processing as much wattle land was put to other crops, because of the low prices paid for the bark.

6,616 tons were produced by Tanganyika Wattle Company, Njombe which had a quota of 6,700 tons per annum. The price of wattle extract averaged just over £40 per ton.

WHEAT

1962 was an excellent year for wheat in Northern Region and a record crop of 16,634 tons was produced, 1,400 tons of which came from African farmers. While the heavy short rains of 1961/62 created problems in cultivation, sowing and weed control in the Region, residual moisture helped the long rain crop. The yield potential and range of adaptability of the new major varieties in the field has increased their popularity in the whole of the Northern Region. The main varieties planted there were W. 48, W. 665, W. 668, W. 61 and a small acreage of W. 1790. W. 665, W. 668 and W. 1790 yielded particularly well.

Wheat was also grown in the highland areas of Njombe, Iringa, Songea and Sumbawanga districts, but at present quantities produced are small and usually locally consumed. In all 313 tons of wheat meal and flour were exported from Tanganyika in 1962 compared with 123 tons during 1961.

SECTION IV

MINOR CROPS

With its wide range of conditions of rainfall, climate, altitude and soils, Tanganyika produces a great variety of crops. Many of these are only of minor importance and are reported under this section until they have graduated into the section under Major Crops or have become too unimportant to mention.

(a) *Barley*

Although there is a growing demand for malting barley, the more economic return from wheat, which thrives under same conditions, has limited the growing of barley. Only a very small acreage was grown in the highland areas of Arusha, Kilimanjaro, Mbulu, Njombe and Mbeya districts.

(b) *Betel Nuts*

The production was confined in Tanga Region along the Pangani river; 80 tons were marketed.

(c) *Chillies*

Chillies are grown largely in Northern Region where prices fell drastically during the year. Production for the year was estimated at 80 tons which sold at 35/- to 40/- per frasila compared with 60/- to 65/- in 1961.

(d) *Cocoa*

Development in cocoa was confined to seedling production and distribution including major steps in establishing observational trials to earmark best areas and cultural methods for future expansion.

16,000 seedlings were sold from Ministry's nursery in Tanga during the year and a further 26,000 will be ready for sale in March, 1963. The seed bearers at Kizugu, Tanga flourished with heavy bearing during the year and provided seed for Tanga and Southern Highlands nurseries including two estates in Tanga. Two additional plots were planted with Ghana type for further seed supplies. Some 5,000 seedlings were distributed in the Rungwe Lake shore area where tremendous interest for this crop exists.

(e) *Essential Oils*

In Tanga production fell off owing to labour difficulties to 5,000 lb. of bitter orange oil, but the price rose to 19/- per lb. Equipment for the extraction of geranium oil exists on one of the estates at Uwembe in Njombe district.

(f) *Irish Potatoes*

Production of Irish potatoes is becoming exceedingly important in most highland areas as food supplement for the farmers and for the local markets. Estimated total production was 7,420 tons of which 5,420 tons moved to local markets outside the producing areas.

(g) *Banana*

This crop is included under "Minor Crop" only for the purpose of a report covering the whole of Tanganyika. In Regions like West Lake and Northern, bananas rank quite high up on the list of major crops, not only as a main source of diet, but also as an invaluable item for cash. Total production was estimated at 446,000 tons of which some 59,700 tons was marketed outside the producing areas.

The weather was generally very ideal for banana growth and production. In Bukoba haphazard organizations exported nearly 2,000 tons to East Lake via E.A.R. & H. steamers and road.

Standards of husbandry continued to improve in the main producing areas. The planting of banana on steep slopes in place of annual crops proceeded well in several areas. In addition to plant sanitation and disease control, effort was directed towards thinning out the excessive shade of bananas in the coffee/banana inter-planted shambas.

Panama wilt was identified in Ngyani in the Meru area of Arusha district. Treatment against banana weevil in Karagwe district continued. Elsewhere no major pests of diseases were recorded.

(h) *Citrus*

Fruit production as a cash crop in those areas within easy reach from big towns continued to assume an ever-increasing importance. Kisarawe supplied Dar es Salaam market with citrus and fresh pineapples. Ulugurus citrus was mainly consumed in Morogoro, but substantial quantities also reached Dar es Salaam market. Muheza citrus and pineapple crops were either consumed locally or exported to Mombasa. Total production of citrus alone was estimated at 7,720 tons out of which 4,740 tons were marketed outside the producing areas.

Lime juice factory at Mahurunga (Mtwara) worked below its capacity owing to inadequate supply of lime. Many of the former lime plantations in the neighbourhood of the factory have been neglected and encroached by "buffalo bean" weed. On a sample check in one area, only 40 per cent of the limes have survived but adequate nursery stocks remain to bring the acreage up to the level required by the factory. Citrus nurseries were also maintained at Kireka, Morogoro, Sisal Research Station, Mlingano and several Local Authority nurseries in various parts of the Republic where Extension staff supervised the work.

(i) *Gums*

Gum Arabica collections was fairly active in Central Region where 367 tons were sold. And an estimated 872 tons of gums were marketed mainly from Lake, Central and Western Regions. Export from Tanganyika during the year was 781 tons valued £47,225.

(j) *Kapok*

Due to declining prices over the years, declining interest in this crop has resulted. In one Kilosa Estate, kapok was up-rooted to make way for sisal. Total production was estimated at 1,165 tons compared with 946 tons last year.

(k) *Kenaf (Hibiscus fibre)*

Kenaf continued on a trial basis and satisfactory results were obtained in Ulanga and below Rift, Arusha. In Arusha ECR 985/986 selection on two acres gave a total fibre yield of 3,600 lb. and was valued at £56 per acre. Further trials on production and processing will continue.

(l) *Onions and Garlic*

1962 was generally a good year for onions and reports from all Regions were encouraging. Total production was estimated at 12,710 tons with every Region contributing to the total production. Extension staff continued to assist with seed supplies and advice. A pamphlet prepared by a Field Officer in Moshi was particularly invaluable to junior staff and literate farmer. Northern Region was main producer where the use of sulphate of ammonia is becoming common. It is estimated that 5,000 tons were exported from Northern Region alone.

(m) *Palm Oil and Palm Kernels*

Production continued to expand in Kigoma district and an estimated 2,000 tons of kernel and 250 tons of oil were sold in the Western Region. One estate in Tanga stepped up production to approximately 75 tons of kernel and 100 tons of palm oil.

(n) *Papain*

Production continued to decline and only 52 tons were exported during the year compared with 72 tons in 1961. About 45 tons were produced in Northern Region and some 15 tons in Eastern Region, where the recent trend of rising prices, up to Shs. 22/- per lb., encouraged new plantings in Kilosa estates. Work on selection of hermaphrodite material continued in Northern Region.

(o) *Vegetables*

Total production of vegetables was estimated at 10,200 tons. Weather was generally ideal in highland areas of the Republic. Like fruit and citrus, vegetables are important cash crop in areas near big towns.

Several agricultural offices in the districts maintained stocks of vegetable seeds for sale to farmers, usually employing Native Authority revolving funds. Problems of periodic gluts, shortages and transport to distant consuming areas remained acute throughout. Few people engaged in off-season production by irrigation near big towns to catch the higher prices created by low supplies.

(p) *Rubber*

The development of Rubber in the Kilombero Valley remained at a planning stage. The one estate in Ulanga produced 15 tons of rubber from aged trees.

(q) *Other crops*

A small quantity of raffia is produced on the coast and bailed for export in Mafia. Some 40 tons of Allanblackia Nuts were sold in the Turiani area at prices ranging from cents 66 to 75 per kilo. There are enormous production of mangoes in Tabora, Nzega and Kahamo and to some extent elsewhere. Mangoes are widely sold but records of sales do not exist. One estate in Tanga Region produced about $\frac{1}{2}$ ton of black pepper and another estate produced $\frac{1}{2}$ ton of nutmeg. Seedlings of nutmeg were propagated for sale to local cultivators.

SECTION V

ANIMAL HUSBANDRY AND DAIRY INDUSTRY

In July the Agricultural Extension Division took over many duties formerly carried out by the Veterinary Division. There was some delay in assuming complete responsibility, particularly in stock marketing, due to shortage of staff to undertake the work, and in some areas transfer of duties was not complete even at the end of the year.

The normal rains of 1962 in general led to good growth of grass and grazing was reported adequate in most parts except where some low-lying land was flooded. Controlled grazing schemes were initiated in several over-stocked areas. In Nzega, organization of such schemes worked fairly well except at the height of dry season when livestock tended to drift into "reserve" areas. In Central Region no major progress was made on the two pilot grazing schemes at Hombolo (Dodoma) and Wiyenzele (Mpwapwa). At Wiyenzele the object originally was to use controlled grazing as a means of catchment protection for the Wiyenzele dam which unfortunately breached immediately on filling on 27th December and, as such, there was no immediate urgency with regard to protecting the catchment. Enclosure of grazing land in North Mara cattle areas continued very satisfactorily.

Results of the Extension effort to increase planting of fodder grasses and improved pasture were encouraging in Northern Region. In Arusha, Rhodes grass seed was distributed from a 3-acre grass plot at Malala and there was extensive planting of elephant grass in wetter areas. A *Cenchrus ciliaris* plot was established at Kisongo to provide for seed distribution to drier areas. In Bukoba condition of stock remained poor due to the poor grazing from leached "rweya" grass.

Trials in integrating cattle with coconut in Tanga made rapid progress during the year. With only 4 such schemes at end of 1961, there were 12 fully developed schemes and an additional 24 in the making at the end of the year. The more established schemes have shown great improvement in coconut yields, improved grazing and milk production.

The Control of regeneration of bush in the schemes was effected merely by slashing followed by a second slashing of young growth as soon as it appeared. This method, in fact, proved more successful and economic than the former method of using arboricides.

Preliminary arrangements have been made for the distribution on loan or sale of improved surplus cattle from Government farms to stock owners proved capable of managing and feeding these improved stock. At present there are two types of cattle available. The first type is Boran (for beef production) with possible sources at Malya, Urambo, Tanga and Nachingwea Government farms. The second type is the Indo-African zebu (for dual purpose of beef and milk production) with possible sources at Mpwapwa, Ukiriguru, Mbozi, Seatondale, Tengeru and later from Tanga, Maruku and Mwanhala Government farms.

There were 900 head of grade dairy cattle kept by Chaggas on the slopes of Kilimanjaro district under an improved version of the Chagga traditional system of husbandry. It is also reported that over 1,000 people in Kilimanjaro district were persuaded to house their indigenous cattle in *bomas*.

West Lake and Southern Regions remained seriously under-stocked with cattle. In West Lake the proposed Kitengule Ranching Scheme for slaughter stock and breeding for the West Lake Region restocking programme was revived. The Commissioner of Prisons agreed to construct a Prison Camp in the area in order to offer free labour for tsetse clearings, construction of access roads and cattle tracks, etc. At the time of writing work on building of temporary accommodation for initial prison staff had already begun.

The Southern Region (excluding Songea) is grossly understocked with cattle, sheep and goats. Consequently, the only animal protein available in the diet of the population is from poultry, wild pig and fish along the coast. A stock route opened in 1959 between Kilosa and Nachingwea was never opened in 1962 because of bad weather and it is unlikely that it will come into use again due to high maintenance costs. Preliminary arrangements are therefore being made for an alternative route, preferably using facilities provided by the Tanganyika Agricultural Corporation.

The Commercial production of milk and milk products was largely confined to Northern Region, North Mara and Musoma districts.

In the Northern Region, Arusha and Kilimanjaro Dairy Board was established in September. The Board sat only twice before the end of the year but covered considerable preliminary ground in appraising the current condition of the industry, and produced by-laws requiring the keeping of records and the submission of returns from producers and distributors. On the whole milk production in the Northern Region has been declining steadily during the last few years. Daily delivery during the year was estimated at 3,500 gallons per day. At the end of the year milk was being supplied by about 70 non-Africans owning grade cattle, 42 of whom were supplying about 70 per cent of the total milk on long term contracts to 3 principal distributors. The daily sales of fresh, pasteurised and sour milk in and around Moshi and Arusha towns averaged about 2,600 gallons.

Locally produced milk, varying from "sour" to "putrid", in Arusha and Meru was estimated at 1,500 gallons per week for about four months of the year, while about 2,000 gallons of the same type per week was offered for sale in Kilimanjaro district. Prices paid for this milk ("sour" to "putrid") ranged from 2/- per gallon in times of plenty to Shs. 4/50 per gallon in time of scarcity. The only regular commercial production by Africans was from the Chagga owners of grade dairy cattle.

The UNICEF Milk Scheme in Northern Region made very little progress during the year. In August a re-assessment of the whole scheme was carried out by the Dairy Extension Officer in the area and UNICEF technologists. Details of financial implications are now under consideration by Ministry of Commerce and Industry.

Dairy enterprises were planned for the Wameru buying alienated farms at Ngare Nanyuki, the Mbuyuni Settlement Scheme and the Barabaig of Mbulu district.

Ghee production and marketing in North Mara was taken over by cattle owners co-operatives societies and later by the "Wafugaji wa Mara" in order to improve the marketing and grading of milk products in that area. On the 16th of November, 1962 a contract was signed between the Co-operative Union and Kenya Co-operative Creameries Ltd. and since that date all ghee from North Mara and Musoma has been sent to the Kenya Co-operative Creameries. With the control of this grading approximately 75 per cent of the ghee produced was passed as first grade. Total receipts for the societies from 1st June to 11th December, 1962 were:—

1st Grade 162,011.5 lb. valued at	...	...	...	Shs. 372,626.35
2nd Grade 87,888.5 lb. valued at	...	...	...	Shs. 192,694.75
3rd Grade 4,497 lb. valued at	...	...	...	Shs. 7,644.90
TOTAL VALUE				Shs. 572,966.00

This improvement in quality was entirely attributable to strict and fair grading together with the increase in price for a quality product. At the above rate of production and grading it would be reasonable to estimate the yearly production of North Mara and Musoma ghee at 750,000 lb. with approximate value of Shs. 1,650,000/- per annum, a phenomenal improvement over previous years production.

Elsewhere in Tanganyika the dairy industry remained small, erratic and scattered. Few individuals and groups near larger towns and Dar es Salaam maintained regular supplies of milk usually at very attractive prices throughout the year. In Southern Highlands Region there were two dairies operating at Mbeya and Iringa and a ghee producing co-operative society was formed at Wangimombe, Njombe district.

The Agricultural Extension staff, in close co-operation with Veterinary, Research and Development divisions, continued to press ahead with poultry improvement schemes. Thousands of improved breeding stock and exotic birds were made available to farmers from the several rearing units maintained by the Ministry in a number of Regions. As yet demands exceed supplies.

SECTION VI

AGRICULTURAL EXTENSION METHODS

There was no radical change in our approach to the farming public. Tanganyika is a vast and varied country and methods of agricultural extension vary from place to place according to the nature of the problems and reaction of the people. Provided officers in the field are well versed in the general branches of agricultural sciences and have reasonable personality, experience and acceptable approach to the public, they are given every encouragement to use their own initiative in finding out which methods bring response.

The main approach of extension continued to be directed towards the more receptive individuals with the aim of producing focal demonstration points. Group teaching was also carried out and wherever appropriate use was made of visual aids prepared by the Community Development. Group teachings were followed up by individual contacts and the more receptive farmers received concentrated attention from field staff in order to create a wider scatter of focal points of demonstration. Every effort was made to concentrate staff (as much as our slender resources permitted) in those areas suited for more rapid development and to supplement advisory work by active practical demonstrations including the preparation and distribution of simple advisory pamphlets.

A new and valuable approach in the "umoja" spirit of Nation Building with close co-operation, support and participation from everyone (politician, civil servant and general public alike) greatly facilitated the work of Extension Field staff.

The establishment of the Agricultural Credit Agency has gone quite a long way towards broadening our contact with farming public and recipients have added to the over expanding nucleus of progressive farmers.

The Agricultural magazine "Ukulima wa Kisasa" continued to prosper during the year and circulation was running at about 18,000 copies a month at the end of the year. An innovation during the year was the setting of the centre pages in the form of instructional booklet. Booklets so far published have dealt with tea, onions, poultry, cashew and hides and skins. Five thousand reprints of each booklet have been obtained for issue free on request by farmers.

The quarter hour radio programme on recordings received from correspondents in the Regions continued. In addition, 17 broadcasts were made by the Junior Minister.

SECTION VII

SOIL AND WATER CONSERVATION

The officers of this division carried on advisory work on methods and advantages of Soil and Water Conservation to the country as a whole. Over all responses were very encouraging. In Kilimanjaro and Arusha districts where land is becoming increasingly in short supply it was rather difficult to arrest cultivation on river banks. Instead, however, farmers were advised to plant perennial crops and fodder grasses e.g. *Setaria splendida* and elephant grass on contour banks. During the year a successful campaign was launched to encourage farmers staying around Mt. Meru to plant bananas on the steep slopes in order to prevent soil washaway.

As a result of the continuation of the indigenous system of ridge cultivation with years of hard work by the field staff, the standard of soil conservation in the Southern Highlands was reported to be satisfactory. Except in North Mara district where strip cultivation is the general practice, and parts of Maswa and Shinyanga districts where ox-ploughed land is usually flat planted, ridging remained the standard practice in Lake Region. As well as this, gully control work was encouraged particularly in Northern Sukumaland and good work done by communal turn-outs was reported as a result.

In some places of the West Lake Region, notably in Ngara, contour banks with live barrier hedges have been reasonably maintained; their usefulness after being on site for a number of years is now very apparent as in many steep sloped holdings, an almost terrace like effect is shown. New areas were carefully surveyed and contours laid down in the new pyrethrum fields both in the Northern and Southern Highlands Regions.

On the debit side, however, there was an obvious negligence by some short-sighted farmers in Lushoto area, who failed to carry out such conservation measures as terracing, trash bunding, etc. Added on to this, over-grazing and over-cultivation resulted in some considerable erosion over the whole hill-sides during the year.

SECTION VIII

NATURAL RESOURCES CENTRES

There are a few Natural Resources Centres in the Country. The division continued to maintain a number of demonstration plots at these places. At Ibologero, in Nzega, good yields of maize, groundnuts and cotton were obtained. Demonstration plots on coffee and bananas have been established at Nyaishoshi and Kayanga in Korogwe and Bukoba districts respectively. These plots including both Robusta and Arabica Coffee proved very useful in illustrating to farmers the benefits of clear weeding, mulching, spraying, pruning and correct spacing.

Lack of funds from local councils made the running of these centres extremely difficult and development of some, e.g. Igunga in Nzega was hindered. On some others the division ran nurseries for supplying seedlings to farmers, e.g. cocoa and coconut nurseries in Tanga, cocoa and oil palm nurseries at Nyigilo, Tukuyu district.

SECTION IX

STAFF

Prior to the formation of the Agricultural Extension Division as one of the seven new divisions which came into being as a product of the re-organization of the Ministry in July, Mr. M. Lunan continued to direct affairs as Commissioner, Mr. D. H. Drennan, Deputy Commissioner acting as Commissioner during Mr. Lunan's leave.

On 1st July, Mr. Drennan was appointed Director of the new Extension Division and Mr. N. E. S. Mutter, Senior Agricultural Officer, promoted as Assistant Director. With the assumption of added responsibilities for animal husbandry some staff of all ranks, previously of the Veterinary Division, joined the new Extension Division and Mr. S. B. Matovu and Mr. G. G. Mhina, Senior Veterinary Practitioners became Regional Extension Officers, a title by which all Senior Agricultural Officers were re-designated. Three Agricultural Officers, Messrs. I. S. Mkwawa, D. A. Mwakosya and J. S. Ishengoma were promoted to Regional Extension Officer rank; Mr. Mkwawa proceeding further to the post of Permanent Secretary, Ministry of Agriculture, on Mr. Forbes' retirement in December. Five Makerere graduates joined the Ministry as Agricultural Officers, four coming to the Extension Division. One Field Officer, Mr. D. C. Muri was promoted to the rank of Agricultural Officer; Mr. A. M. Pienaar, Field Officer was promoted to Senior Field Officer. One Agricultural Officer, Mr. M. J. F. Pash joined the division on direct recruitment from the United Kingdom. Ten Field Officers joined the Ministry during 1962, nine by recruitment from the United Kingdom; only one, however, came to this division (Mr. D. G. Slater). On the other hand, of thirteen serving officers who received promotion to Field Officer rank after completing further training courses abroad, twelve came to the Extension Division.

On the debit side, Mr. N. R. Fuggles-Couchman, Assistant Commissioner retired after 32 years service in Tanganyika. Of four Agricultural Officers retiring in 1962, two served in this division. Six Field Officers retired or left on completion of contract.

After training in Israel, thirteen Assistant Field Officers, Grades II and III were promoted to Grade I rank. The Ministerial establishment in this Grade (I) is 94. Again an establishment at Assistant Field Officer, Grades II and III level of 1,143 (this figure excludes the Veterinary Division), some 250 vacancies were outstanding as at the end of 1962. The Subordinate Service establishment (again excluding the Veterinary Division) was 1,189.

The build-up of training courses left the division very short staffed for most of the year, a position which holds good to the present. However, the long-term effect of this enhanced training programme cannot be over-estimated and its effect is already beginning to be felt.

In September, a Ministerial directive instructed the appointment as a matter of policy, of officers who are Tanganyika citizens as officers in charge of Extension in all Districts. This involved a major movement of staff and here, I wish to record gratefully the understanding and co-operation of all officers, especially those up-country many of whom were required to transfer at short notice. It is to their great credit that this policy has been implemented so smoothly.

SECTION X

CONCLUSION

I record my appreciation of the loyal and devoted service rendered by the staff of all grades throughout the year. Despite many changes in the staff, there was a general acceleration in the tempo of Agricultural Development and the farming public was never, at any time, left alone without some help.

Thanks of the division are also accorded to all the various members of the Boards and Committees that assist in its work, and for the assistance given by all members of the Public and of the service in other divisions and ministries. To all these the Agricultural Extension Division is grateful for their excellent co-operation which enabled its many and often complex problems becoming solved with a team approach.

D. A. MWAKOSYA,
*Director,
Agricultural Extension Division*

MONTHLY RAINFALL IN INCHES FOR THE YEAR 1962 AT REGIONAL STATIONS

	Morogoro		Dodoma		Tabora		Mwanza		Mbeya		Arusha		Tanga		Mtwara		Bukoba	
	1962	44 Yrs. Av.	1962	35 Yrs. Av.	1962	54 Yrs. Av.	1962	37 Yrs. Av.	1962	31 Yrs. Av.	1962	19 Yrs. Av.	1962	33 Yrs. Av.	1962	9 Yrs. Av.	1962	41 Yrs. Av.
January, 1962 ..	2.28	3.62	9.51	5.95	7.09	5.21	6.63	3.75	12.41	7.82	4.62	2.91	4.02	1.26	21.25	9.77	3.49	5.89
February, 1962 ..	0.97	4.06	3.65	4.51	5.06	5.03	2.80	3.98	8.10	6.49	1.53	2.92	0.62	1.73	5.41	5.64	3.00	6.11
March, 1962 ..	4.42	6.45	3.99	4.85	3.09	6.53	4.05	5.94	8.81	6.36	2.62	5.42	0.73	4.62	6.93	5.98	9.97	9.65
April, 1962 ..	6.36	8.04	1.39	1.99	4.85	5.26	10.34	5.98	2.25	4.56	13.17	13.16	6.01	9.11	8.21	7.33	18.02	14.31
May, 1962 ..	4.30	3.84	0.00	0.19	1.51	1.06	5.28	3.58	0.20	0.67	6.19	7.78	3.77	12.95	0.68	1.78	12.47	12.80
June, 1962 ..	0.05	1.03	0.00	0.03	0.00	0.09	2.35	0.17	0.00	0.02	1.41	0.67	5.26	2.92	0.15	0.48	1.80	3.84
July, 1962 ..	0.53	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
August, 1962 ..	0.73	0.43	0.30	0.00	0.04	0.04	0.37	0.72	0.09	0.04	0.30	0.52	2.52	2.80	1.63	0.48	4.92	3.12
September, 1962 ..	0.04	0.67	0.05	0.05	0.07	0.26	0.46	1.58	0.31	0.10	0.14	0.67	2.80	3.26	0.33	3.23	4.84	4.13
October, 1962 ..	0.36	1.06	0.09	0.19	3.42	0.67	5.91	2.47	2.13	0.60	0.49	1.06	1.37	4.00	1.37	0.96	4.21	5.11
November, 1962 ..	1.27	2.13	0.40	0.77	7.74	4.05	5.86	4.80	1.31	2.04	3.88	3.45	1.82	4.17	0.08	1.14	4.21	6.29
December, 1962 ..	3.31	2.96	3.69	4.16	10.24	6.68	2.46	5.55	2.24	5.93	6.07	4.90	2.33	3.72	2.91	8.02	6.01	7.46
Total for 1962 ..	24.52		23.02		48.11		47.01		37.06		40.66		33.15		48.96		76.27	
Average for years ...		34.86		22.69		35.69		30.55		34.73		47.27		52.93		45.04		79.75

CROP STATISTICS

SISAL

Year				Total Production in tons
1959	...	...	...	205,273
1960	...	...	...	204,468
1961	...	...	...	197,968
1962	...	...	...	214,032

COTTON LINT

Production in bales of 400 lb.

Region				1959	1960	1961	1962
Lake...	...	...	...	182,623	160,652	157,654	190,431
Eastern	...	...	...	13,313	16,547	3,501	2,908
Tanga	...	...	...	2,307	4,148	550	430
Northern	...	...	...	2,135	5,000	1,794	1,781
Western	...	...	...	914	1,906	3,152	4,450
West Lake	...	...	...	316	318	685	1,064
				201,608	188,571	167,336	200,064

COTTON SEED

Tons surplus to seed requirements for planting

Region				1959	1960	1961	1962
Lake...	...	...	...	54,900	45,433	44,672	45,391
Eastern	...	...	...	4,100	4,334	317	4,961
Northern	...	...	...	650	1,650	340	1,724
Tanga	...	...	...	850	900	75	1,113
West Lake	...	...	...	50	50	44	-
Western	...	...	...	350	450	576	-
				60,900	52,817	46,024	53,189

COIR

Tons estimated production

Region				1959	1960	1961	1962
Tanga	...	...	...	-	589	2,730	1,430

KAPOK

Tons estimated production

Region				1959	1960	1961	1962
Eastern	...	...	...	655	814	732	1,050
Tanga	...	...	...	236	163	143	95
Southern	...	...	...	11	9	21	20
				902	986	946	1,165

COFFEE

Mild Coffee

Tons of clean coffee produced

Region	1959	1960	1961	1962
Northern	10,303 ...	16,585 ...	9,511 ...	12,084
Southern Highlands ...	2,744 ...	2,996 ...	2,125 ...	2,684
Southern	1,083 ...	1,135 ...	1,500 ...	1,240
Tanga	513 ...	656 ...	479 ...	383
Western	3 ...	6 ...	55 ...	40
	<u>14,646 ...</u>	<u>21,378 ...</u>	<u>13,670 ...</u>	<u>16,431</u>

COFFEE

Hard Coffee

Tons of clean coffee produced

Region	1959	1960	1961	1962
West Lake	8,948 ...	8,570 ...	5,358 ...	9,769
Eastern	265 ...	1,004 ...	626 ...	535
Lake... ...	55 ...	36 ...	180 ...	130
Tanga	88 ...	64 ...	40 ...	55
Western	67 ...	72 ...	30 ...	80
	<u>9,423 ...</u>	<u>9,746 ...</u>	<u>6,234 ...</u>	<u>10,569</u>

TEA

Lb. manufactured

Region	1959	1960	1961	1962
Southern Highlands ...	5,202,810 ...	5,003,750 ...	5,831,638 ...	5,988,300
Tanga	2,951,724 ...	3,201,764 ...	3,998,323 ...	3,514,598
	<u>8,154,534 ...</u>	<u>8,205,514 ...</u>	<u>9,829,961 ...</u>	<u>9,502,898</u>

COCOA

Tons produced

Region	1959	1960	1961	1962
Tanga	Nil ...	Nil ...	— ...	30

PYRETHRUM

Tons of dry flowers produced

Region	1959	1960	1961	1962
Southern Highlands ...	316 ...	457 ...	634 ...	702
Northern	483 ...	553 ...	640 ...	1,184
	<u>799 ...</u>	<u>1,010 ...</u>	<u>1,274 ...</u>	<u>1,886</u>

WATTLE EXTRACT

Tons produced

Region	1959	1960	1961	1962
Southern	Nil ...	6,115 ...	6,326 ...	6,407
Tanga	Nil ...	480 ...	530 ...	1,518
	<u>Nil ...</u>	<u>6,595 ...</u>	<u>6,856 ...</u>	<u>7,925</u>

TOBACCO
Flue Cured
Lb. produced

<i>Region</i>	1959	1960	1961	1962
Southern Highlands ...	3,589,488	2,861,736	2,322,880	1,688,523
Western ...	1,164,800	1,108,800	1,312,733	800,000
Southern ...	6,720	Nil	Nil	Nil
West Lake ...	8,960	Nil	Nil	Nil
	<u>4,769,968</u>	<u>3,970,536</u>	<u>3,635,613</u>	<u>2,488,523</u>

TOBACCO
Fire Cured
Lb. produced

<i>Region</i>	1959	1960	1961	1962
Southern ...	1,144,640	1,046,080	2,136,960	990,080
Western ...	206,080	51,520	150,080	313,800
West Lake ...	—	—	—	56,000
	<u>1,350,720</u>	<u>1,097,600</u>	<u>2,287,040</u>	<u>1,359,880</u>

TOBACCO
Aromatic
Lb. produced

<i>Region</i>	1959	1960	1961	1962
Western ...	—	—	24,043	20,350
Southern Highlands ...	—	—	3,272	10,750
Central ...	—	—	3,475	3,503
	<u>—</u>	<u>—</u>	<u>30,790</u>	<u>34,603</u>

SEED BEANS
Tons exported

<i>Region</i>	1959	1960	1961	1962
Northern ...	3,885	5,000	1,920	5,748
Southern Highlands ...	3	21	21	Nil
	<u>3,888</u>	<u>5,021</u>	<u>1,941</u>	<u>5,748</u>

SEED PEAS
Tons produced

<i>Region</i>	1959	1960	1961	1962
Southern Highlands ...	—	—	286	250

COPRA
Estimated tons produced

<i>Region</i>	1959	1960	1961	1962
Eastern ...	5,218	4,855	3,896	3,000
Tanga ...	5,751	4,210	4,350	2,839
Southern ...	637	479	446	700
	<u>11,606</u>	<u>9,544</u>	<u>8,692</u>	<u>6,539</u>

SUGAR
Tons refined

<i>Region</i>			1959		1960		1961		1962
Northern ...	...	...	26,791	...	26,963	...	26,713	...	26,766
Eastern ...	...	...	Nil	...	Nil	...	Nil	...	10,000
West Lake ...	...	...	850	...	1,661	...	2,006	...	2,455
			<u>27,641</u>	...	<u>28,624</u>	...	<u>28,719</u>	...	<u>39,221</u>

JAGGERY
Estimated tons produced

<i>Region</i>			1959		1960		1961		1962
Eastern ...	...	...	—	...	—	...	2,205	...	2,320
Northern ...	...	...	—	...	—	...	3	...	200
			<u>—</u>	...	<u>—</u>	...	<u>2,208</u>	...	<u>2,520</u>

CASHEW NUTS
Tons produced

<i>Region</i>			1959		1960		1961		1962
Southern ...	...	...	24,102	...	41,288	...	25,933	...	46,500
Eastern ...	...	...	4,279	...	13,912	...	2,586	...	8,460
Tanga ...	...	...	20	...	52	...	60	...	40
			<u>28,401</u>	...	<u>55,252</u>	...	<u>28,579</u>	...	<u>55,000</u>

PAPAIN
Estimated tons produced

<i>Region</i>			1959		1960		1961		1962
Northern ...	...	...	—	...	—	...	65	...	45
Eastern ...	...	...	—	...	—	...	1	...	15
			<u>—</u>	...	<u>—</u>	...	<u>66</u>	...	<u>60</u>

RUBBER
Estimated tons produced

<i>Region</i>			1959		1960		1961		1962
Eastern ...	...	...	—	...	43	...	30	...	5

ESSENTIAL OILS
Lb. produced

<i>Region</i>			1959		1960		1961		1962
Tanga ...	...	...	—	...	10,000	...	9,000	...	5,000

ESTIMATED QUANTITY MARKETED

MAIZE
Tons

Region	1959	1960	1961	1962
Northern...	22,000	26,000	3,800	13,700
Southern Highlands	14,000	14,000	10,700	17,100
Western	11,400	14,000	12,100	7,000
Eastern	7,400	5,800	6,700	15,000
Lake	5,300	5,100	4,400	13,600
Southern	5,300	5,100	7,400	1,700
Tanga	2,400	4,300	2,300	Nil
Central	2,600	3,400	2,700	2,500
West Lake	30	200	400	1,200
	70,430	77,900	50,500	71,800

SORGHUM
Tons

Region	1959	1960	1961	1962
Northern...	-	-	-	-
Southern Highlands	-	17	14	14
Eastern	-	2,300	1,000	330
Southern	-	1,200	2,300	3,300
Lake	-	-	200	815
West Lake	-	26	200	580
Western	-	1,800	2,500	1,200
Central	-	50	900	300
	-	5,393	7,114	6,539

MILLETS
Tons

Region	1959	1960	1961	1962
Southern Highlands	-	200	900	900
Southern	-	200	300	100
Lake	-	-	5,700	5,000
Western	-	7,700	4,000	6,500
Central	-	1,300	700	1,000
	-	9,400	11,600	13,500

WHEAT
Tons

Region	1959	1960	1961	1962
Northern...	6,900	11,400	5,100	16,600
Southern	200	200	200	300
Southern Highlands	100	-	100	100
Western	60	80	100	300
Eastern	10	20	20	-
	7,270	11,700	5,520	17,300

RICE
Tons of Paddy

Region	1959	1960	1961	1962
Lake	4,200	2,600	2,700	16,100
Southern Highlands	7,100	3,100	4,900	2,900
Eastern	7,100	11,500	9,200	2,000
Western	3,000	10,300	30	15,000
Tanga	6,500	4,600	3,600	2,000
Southern	2,300	2,400	2,300	800
Northern... ..	300	400	200	700
Central	40	30	10	20
	30,540	34,930	22,940	39,520

BARLEY
Tons

Region	1959	1960	1961	1962
Northern... ..	—	50	50	Nil
Southern Highlands	—	20	20	10
	—	70	70	10

PULSES

Tons: including mixed beans, peas, chickpea, cowpea, soyabean and pigeonpea

Region	1959	1960	1961	1962
Northern... ..	6,200	10,200	4,100	8,300
Lake	1,000	1,100	2,500	2,600
Southern Highlands	2,700	2,100	1,800	1,900
Southern	1,800	5,700	3,600	3,000
Western	1,700	2,600	5,600	1,900
Tanga	600	900	400	100
Eastern	1,200	800	600	500
Central	—	300	100	300
West Lake	200	700	900	1,000
	15,400	24,400	19,600	19,600

CASSAVA
Dry Tons

Region	1959	1960	1961	1962
Southern	17,800	13,900	14,600	9,000
Western	6,200	2,900	6,400	4,000
Lake	2,800	11,500	4,800	12,100
Eastern	400	1,400	200	50
Tanga	—	10	20	1,000
Central	100	—	—	10
Southern	10	—	—	1,400
	27,310	29,710	26,020	27,560

POTATOES
Tons

Region	1959	1960	1961	1962
Northern... ..	—	900	900	4,800
Southern Highlands	—	1,500	1,600	Nil
Tanga	—	400	300	200
Eastern	—	100	50	30
Southern	—	100	50	30
Lake	—	—	50	100
West Lake	—	—	250	250
Western	—	200	10	10
	—	3,200	3,210	5,420

SWEET POTATOES
Tons

Region	1959	1960	1961	1962
Northern... ..	—	—	1,000	2,000
Southern Highlands	—	—	900	2,900
Tanga	—	—	Nil	Nil
Eastern	—	—	Nil	100
Lake	—	—	—	1,100
West Lake	—	—	1,100	1,300
Southern	—	—	Nil	Nil
Central	—	—	5,100	10,700
	—	—	8,100	18,100

VEGETABLES
Tons

Region	1959	1960	1961	1962
Northern... ..	—	900	900	2,200
Southern Highlands	—	500	300	600
Tanga	—	800	700	800
Eastern	—	900	800	900
Lake	—	60	60	60
West Lake	—	10	50	50
Central	—	—	100	100
	—	3,170	2,910	4,710

ONIONS
Tons

Region	1959	1960	1961	1962
Northern... ..	3,600	4,700	3,800	4,500
Central	2,000	1,600	700	1,500
Southern Highlands	200	200	600	100
Southern	50	20	10	10
Tanga	500	400	300	300
Lake	30	30	30	300
Western	10	20	60	150
Eastern	200	1,200	1,200	1,100
West Lake	10	10	—	—
	6,600	8,180	6,700	7,960

BANANAS AND PLANTAINS

Tons

Region	1959	1960	1961	1962
Northern...	—	—	16,000	30,000
Southern Highlands	—	—	200	200
Tanga	—	—	3,000	3,000
Eastern	—	—	800	800
Southern	—	—	200	200
Lake	—	—	—	1,000
West Lake	—	—	20,000	23,000
Western	—	—	500	500
Central	—	—	1,000	1,000
	<u>—</u>	<u>—</u>	<u>41,700</u>	<u>59,700</u>

CITRUS FRUIT

Tons

Region	1959	1960	1961	1962
Northern...	—	—	40	230
Tanga	—	—	400	400
Eastern	—	—	350	350
Southern	—	—	—	—
Lake	—	—	—	3,700
West Lake	—	—	100	50
Central	—	—	10	10
	<u>—</u>	<u>—</u>	<u>900</u>	<u>4,740</u>

SUNFLOWER SEED

Tons

Region	1959	1960	1961	1962
Eastern	200	700	1,000	3,000
Western	2,200	3,800	2,900	3,800
Southern Highlands	1,000	1,100	600	2,000
Southern	500	600	1,100	1,100
Lake	150	400	400	500
Central	600	700	200	1,900
Northern...	100	100	50	100
Tanga	20	10	—	100
	<u>4,770</u>	<u>7,410</u>	<u>6,250</u>	<u>12,500</u>

Groundnuts

Tons

Region	1959	1960	1961	1962
Western	3,900	11,000	3,700	5,700
Central	7,700	6,800	1,100	4,400
Southern	3,400	3,600	3,600	4,800
Lake	700	1,200	200	1,100
Northern...	60	40	20	30
Southern Highlands	150	150	150	300
Eastern	10	10	10	20
West Lake	10	30	40	150
	<u>15,930</u>	<u>22,830</u>	<u>8,820</u>	<u>16,500</u>

Sesame
Tons

Region	1959	1960	1961	1962
Southern	8,700	7,300	5,400	7,000
Eastern	800	1,200	1,200	1,100
Southern Highlands	350	350	300	240
Lake	200	270	500	230
Western	100	300	200	160
Central	100	100	40	10
Tanga	—	10	Nil	Nil
	<u>10,250</u>	<u>9,530</u>	<u>7,640</u>	<u>8,740</u>

Castor Seed
Tons

Region	1959	1960	1961	1962
Central	3,200	5,800	3,400	7,000
Northern... ..	1,600	1,800	1,000	2,000
Southern	800	800	700	1,000
Eastern	600	1,500	1,500	2,000
Southern Highlands	500	400	400	1,000
Lake	—	—	—	—
Western	30	50	40	400
Tanga	90	400	20	500
West Lake	60	60	40	100
	<u>6,880</u>	<u>10,810</u>	<u>7,100</u>	<u>14,000</u>

Palm Kernel
Tons

Region	1959	1960	1961	1962
Western	450	730	800	2,000
Tanga	20	35	50	75
	<u>470</u>	<u>765</u>	<u>850</u>	<u>2,075</u>

Palm Oil
Tons

Region	1959	1960	1961	1962
Western	50	65	280	250
Tanga	30	30	40	100
	<u>80</u>	<u>95</u>	<u>320</u>	<u>350</u>

ESTIMATED QUANTITY MARKETED

Gums
Tons

Region	1959	1960	1961	1962
Western	460	690	352	300
Lake	925	655	250	200
Central	302	353	441	367
Southern	3	2	2	5
	<u>1,690</u>	<u>1,700</u>	<u>1,045</u>	<u>872</u>

EXPORTS FROM TANGANYIKA OF AGRICULTURAL PRODUCTS, 1960-1962

	Maximum export prior to 1962		1960	1961	1962	Export value 1962	Approx. of total export value
	Year	Tons	Tons	Tons	Tons	£	
1. Sisal... ..	1959	208,767	207,225	200,909	219,519	15,734,144	40.0
2. Cotton Lint ...	1960	38,869	38,869	29,668	32,579	7,392,659	17.6
3. Coffee (Clean) ...	1960	25,077	25,077	24,615	25,668	6,575,252	16.6
4. Cashewnuts ...	1961	39,962	36,718	39,962	59,013	2,335,273	5.9
5. Tea	1961	3,163	3,160	3,163	3,899	1,611,909	4.1
6. Animal Feeding (not unmilled cereal)	—	—	33,799	33,422	36,303	845,922	2.2
7. Beans, Peas and Pulses	1952	23,184	11,545	7,219	10,834	778,670	2.0
8. Other Oil Seeds, nuts and kernels ...	—	—	?	15,414	11,145	667,777	1.7
9. Castor Seed ...	1960	18,357	10,357	10,749	13,448	598,667	1.5
10. Pyrethrum (dry flower)	1961	1,274	1,010	1,274	1,884	565,000	1.4
11. Groundnuts ...	1936	22,786	14,639	3,442	6,414	394,171	1.0
12. Wattle Extract ...	1961	7,452	6,695	7,452	8,060	390,192	1.0
13. Sun flower ...	1957	19,626	12,473	10,672	11,843	352,648	0.9
14. Maize meal and flour	—	—	24,965	18,793	19,147	325,510	0.8
15. Fish	—	—	2,234	1,973	2,239	126,617	0.3
16. Papain	1948	130	72	72	52	105,935	0.27
17. Tobacco	1948	1,421	731	480	404	78,322	0.20
18. Kapok	1957	905	863	840	755	72,034	0.18
19. Gums	1950	2,429	1,467	546	781	47,225	0.12
20. Other cereals whole	—	—	?	2,320	670	29,036	0.07
21. Wattle Bark ...	1955	4,837	1,376	1,704	1,329	22,020	0.06
22. Cassava Flour ...	—	—	—	17,658	1,048	19,582	0.05
23. Vegetable Oils ...	1940	2,268	142	180	175	16,599	0.04
24. Wheat meal and Flour	—	—	45	123	313	16,400	0.04
25. Cigarettes	—	—	Nil	Nil	22	13,903	0.03
26. Chillies	—	—	28	25	133	12,914	0.03
27. Maize whole ...	1956	106,363	45,700	2,454	125	3,912	0.01
28. Sugar and Jaggery...	—	—	71	33	91	3,099	0.01
29. Copra	1928	9,318	1,010	2,391	50	2,250	—
30. Cotton Seed ...	1957	8,387	5,460	2,188	2	42	—
Total	—	—	483,731	439,741	467,945	39,137,684	—



REPUBLIC OF TANGANYIKA

MINISTRY OF AGRICULTURE

Annual Report
of the
Research Division
1962

1964
PRINTED BY THE GOVERNMENT PRINTER
DAR ES SALAAM

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STAFF—RESEARCH DIVISION

(As at 31st December, 1962)

HEADQUARTERS

Director: B. C. Akehurst, M.B.E., B.Sc. (Agric.) (Reading).
Assistant Director: H. G. Hutchison, B.Sc. (Agric.) (Reading), Dip. Agric. (Reading), Ph.D. (Edinburgh).
Experimental Officer: A. Sreedharan, B.Sc. (Travancore).
Librarian: Miss J. Sanderson, A.L.A.
Field Officer: F. Hawkins.
Field Officer: J. M. Robb, Dip. Agric., C.D.D., C.D.A.

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(Private Bag, Kilosa)

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Entomologist: I. A. D. Robertson, B.Sc. (Aberdeen).
Botanist: A. Har-Tzook, M.Sc. (Jerusalem).
Chemist: S. Mansur, M.Sc. (Jerusalem).
Agricultural Officer (Experiments): R. Goodyear, B.Sc. (Agric.) (Leeds).
Field Officer: I. D. Armstrong.

The following officers are seconded from the Empire Cotton Growing Corporation:—
Plant Breeder: R. Smith, B.Sc. (Manchester).
Plant Breeder: T. Bradley, B.Sc. (Liverpool).

(a) Mbozi Experimental Station

Field Officer: K. S. Fairweather.

(b) Seatondale Experimental Station

Field Officer: D. J. Grieve.

(c) Igeri Experimental Station

Agricultural Officer: R. A. Haggarty, B.Sc. (London).

Field Officer: A. Jenkinson.

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(Private Bag, Mwanza)

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Pasture Research Officer: G. D. Scott, B.Sc. (Witwatersrand).
Agricultural Chemist: J. Evans, B.Sc. (Wales).
Agricultural Officer (Economics): M. P. Collinson, B.A. (Reading).
Agricultural Officer (Experiments): M. A. Scaife, B.A. (Cambridge), Dip. Agric. (Cambridge), D.T.A. (Trinidad).
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(b) Mwanhala Experimental Station

Field Officer: J. B. Chibuga.

(c) Malya Livestock Experimental Station

Research Officer: M. L. Kyomo, B.Sc. (London).

Senior Field Officer: E. Lawson.

NORTHERN RESEARCH CENTRE, TENDERU

(P.O. Box 3101, Arusha)

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Entomologist: G. Swaine, B.Sc. (Sheffield).
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Plant Pathologist: P. K. S. Clinton, B.Sc. (Sheffield).
Plant Pathologist: W. T. H. Peregrine, B.Sc. (Hons.), M.Sc. (Wales).
Plant Pathologist: D. R. W. Watson, B.Sc. (Hons.) (Agric.), D.I.A.
Agricultural Chemist: G. D. Anderson, M.Sc. (Agric.), Ph.D. (Durham).
Agricultural Officer (Experiments): J. C. Macartney, B. Agric. Sc. (Belfast).
Pasture Research Officer: Z. Naveh, M.Sc., Ph.D. (Jerusalem).
Field Officer: J. W. Packard.

(a) *Mpwapwa Livestock Experimental Station*

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Field Officer: J. Barke, N.D.A.
Field Officer: N. Mhina.
Field Officer: P. E. Gwynn, N.D.D.
Field Officer: G. Meirion-Jones, N.D.A.

(b) *Tanga Experimental Station*

Livestock Research Officer: G. G. Platt, B.Sc. (Agric.) (Wales).
Field Officer: E. D. L. Bell, Dip. Agric.
Field Officer: B. A. Stevens.

(c) *Horticultural Experimental Station, Muheza*

Agricultural Officer: B. L. Honess, B.Sc. (Reading), D.T.A. (Trinidad).
Field Officer: I. C. Hamblin.

(d) *Pasture Research Station, Kongwa*

(P.O. Kongwa)

Pasture Research Officer: M. A. Owen, B.Sc. (Agric.) (Wales), Dip. Agric. (Reading), D.T.A. (Trinidad).

SOUTHERN RESEARCH CENTRE, NACHINGWEA

(P.O. Box 43, Nachingwea)

Agricultural Officer i/c: B. Walker, B.Sc. (Nottingham), Dip. Agric. (Cantab.), D.T.A. (Trinidad).
Entomologist: M. Bigger, B.A. (Trinity College, Dublin), D.T.A. (Trinidad).
Plant Breeder: A. K. Auckland, B.Sc. (Durham), Dip. Agric. Sc. (Cambridge), D.T.A. (Trinidad).
Agricultural Officer: P. J. Northwood, B.Sc. (Agric.) (Reading).
Experimental Officer: A. Tsakiris, B.Sc. (Poona).
Field Officer: A. Stone.

COMMODITY STATIONS

(Staff Secondment)

Sisal Research Station, Mlingano

(P.O. Ngomeni)

Financed by Tanganyika Sisal Growers' Association

Agricultural Officer: D. Hopkinson, B.Sc. (Oxon).

Coffee Research Station, Lyamungu

(P.O. Box 3004, Moshi)

Financed by Tanganyika Coffee Board

Principal Scientific Officer: J. B. D. Robinson, B.Sc. (Reading), F.R.I.C.
Entomologist: R. G. Tapley, B.Sc. (London).
Horticulturist: L. M. Fernie.
Plant Pathologist: D. A. Burdekin, B.A. (Cambridge).
Agronomist: H. W. Mitchell, B.Sc. (Agric.) (London), D.T.A. (Trinidad).
Chemist: R. M. Baker, B.Sc. (Hons.) (Reading).
Field Officer: J. M. C. Brownbridge, N.D.A., M.B.A.C.
Field Officer: W. C. M. Maxwell, S.D.A., S.D.D.

ANNUAL REPORT OF THE RESEARCH DIVISION, 1962

INTRODUCTION

The major event of the year was a reorganization of the Ministry whereby the Research services became a separate Division, under a Director responsible to the Permanent Secretary, instead of a section of the Department of Agriculture. This did not disturb the old organization but it did mean that the new Division assumed responsibility for all animal husbandry and breeding work that had previously been under the control of the Veterinary Department. The latter retained responsibility only for research on animal health and disease problems. The Research Division thus took over the Livestock Experimental Stations at Mpwapwa, Tanga (the old Tanga Dairy) and Malya. The station at West Kilimanjaro reverted to being a Veterinary Quarantine Station.

Dr. A. C. Evans resigned as Director during the year and Mr. B. C. Akehurst, after acting in the interim period, was appointed to the post right at the end of the period covered by this report. Dr. H. G. Hutchison was appointed Assistant Director from the date of reorganization.

We were unfortunate in losing through resignation the services of three Agricultural Chemists—Messrs. K. G. Pickles, T. Evans and B. Anderson. Messrs. H. J. van Rensburg, Senior Research Officer, J. T. Barton, Agricultural Officer and T. Muir, Field Officer, also retired from the service during the year. The shortage of animal husbandry staff was aggravated by the resignation of Dr. P. Stahl, Livestock Research Officer. But the appointment of two new Livestock Research Officers at the close of the year brightened the picture.

Two Makerere graduates joined the Division straight from University but later resigned, one to go into commerce and the other to study teacher training. We recruited from Israel Messrs. Har-Tzook and Mansur as a plant breeder and a chemist respectively and Dr. Naveh as a Pasture Research Officer from the same source. In addition Mr. R. A. Goodyear joined the Division on first appointment as an Agricultural Officer. Mr. A. Sreedharan returned to duty after attending a statistical course in North Carolina. Mr. T. Apiyo went to America for further study.

In general the Research Division has maintained its strength, though one is concerned by the possibility of losing on retirement a relatively high proportion of the more senior officers. It is also disappointing to note the very poor recruitment of African graduates.

Attempts are being made to organize the work of the Division more on a project basis than it has been in the past to ensure that all aspects of problems chosen for study are being adequately covered. It will thus be possible to see more clearly where the research effort is being made and enable results of investigations to be more quickly applied. It is also hoped that progress will be made in the writing up of completed or, sometimes, partially completed projects.

This report largely follows the pattern of the old Part II Agricultural Reports, but the link between the research work being done and the practical problems of commercial agriculture are now made more obvious. Detailed experimental data are presented in the Report of Experimentation, which is for restricted circulation.

At all centres and, in fact, over most of the country the crop season 1961/62 was very wet. This was largely due to abnormally high rainfall at the beginning of the season, and crop yields suffered because the young plants had to sit for several weeks in wet soil without sunshine. Tobacco crops were particularly severely damaged by these conditions.

The unit previously known as the Tanga Dairy is now called the Tanga Experimental Station since it has ceased to be an intensive dairy unit and will be concerned with the problems of developing cattle and coconut production in the coastal areas. The completion of some water consumption studies has provided interesting data, which include the fact that when grazing is short cattle will automatically restrict their water intake. Night paddocking has produced large increases in the growth of calves. Mortality rates of pure-bred Boer goats have been high and nullified the advantages of such improved stock.

The great benefits of copper spraying Arabica coffee have again been demonstrated in most production areas. The continued adoption of sound basic cultural practices at the Mbimba coffee station resulted in the best crop ever produced there and demonstrated that the Mbozi environment can grow good coffee.

There was further encouraging and successful adoption by cotton farmers at Ulaya of recommended cultural practices. Basic studies of cotton pests at Ukiriguru have commenced in an effort to determine finally the advisability of spraying in Lake Region. Uk 62 seed was bulked for issue to the northern areas of the Region and plans were well advanced for a Uk 63 issue to the southern parts. Fusarium wilt continued to spread but encouraging signs of resistance were noted in existing material. IL 62 was bulked and it continued to out-yield IL 58 at all experimental sites.

Pale-skinned selections from the Mwitunde groundnut stocks again gave very encouraging yields.

The Hibiscus programme was expanded and gave every indication that selection within existing material will provide substantial yield increases. A plot in the Eastern Region produced some very fine quality fibre.

The maize breeding programmes at Ilonga and Tengeru continued their planned progress. The promise of some basic material from Colombia and Mexico is expected to greatly aid this work.

Pyrethrum work was largely a consolidation of previous progress but a major achievement was the establishment of a sub-station near Njombe.

The soya bean breeding project neared its completion with further testing of a number of potential new varieties. Wider testing of some of these varieties has revealed a much greater range of adaptability than had been expected. The sesame breeding work reached the testing stage and it is anticipated that some valuable new material will be produced.

Working in collaboration with the Sisal Research Station the pathology section has determined the causal agent of Zebra disease on the hybrid 11648.

The economics section at Ukiriguru go under way and a preliminary survey in the Bukumbi Chiefdom revealed the benefits likely to accrue from this kind of work.

SOIL FERTILITY

At Ilonga there are still no differences between treatments in the permanent fertility experiment. This is the third year and yields are still high both from controlled and manured plots.

At Chambezi very poor yields were obtained (200 lb. maize per acre) and applications of manure tended to depress them slightly.

At Seatondale both 4½ tons of dung and 20 lb. of nitrogen per acre gave good responses from maize. In the permanent fertility experiment those plots which have been continuously cropped showed a big response to annual applications of fertilizer. Fertilized maize yields are double those of the plots which have not received fertilizer. Weed fallows have made a slight improvement, which tends to be larger the longer they have been down.

At Nachingwea there are still no responses from various methods of stover disposal. The dung and ash experiment continued to show responses in the second residual year; these are large for both the dung and the ash but small for fertilizer. Groundnuts give a picture similar to that of maize but in smaller degree. Three and six tons per acre dressings of dung on the farming systems continue to give increasing responses.

At Mtopwa, on the Makonde Plateau, previous fertilizer work has been done on stumped land after continuous cultivation for a number of years. The responses have been negligible and the general yield-level very poor. In an attempt to study the local problem as it occurs, a new experiment was started on land which had been rested and cleared in the traditional way by slashing and burning. Applications of 1 cwt. of sulphate of ammonia and 1 cwt. superphosphate to plots on this soil have doubled the maize yield to 1,300 lb. per acre and given considerable increases in hill rice yields. This experiment will compare continuous cropping with periods of rest both with and without annual fertilizer applications.

At Suluti (Songea) both fertilizer and dung have increased maize and tobacco yields.

At Ukiriguru the exhaustion plot of cotton, which has been continuously cultivated without fertilizer for 23 years, gave a yield of 195 lb. of seed cotton per acre. An adjoining plot which has received 5 tons of dung and 1 cwt. each of sulphate of ammonia and super-phosphate per acre, for each of the last six years yielded 1,680 lb. of seed cotton per acre. Another area of the farm, which receives 5 tons of dung every four years, appears to be declining in productivity; it is suggested that this rate of application is insufficient to maintain optimum yields. Experiments on maize showed the value of nitrogen but no responses were obtained to other elements. In one experiment 1 cwt. of sulphate of ammonia gave a response of 900 lb. per acre of maize. Experiment 26 comparing two levels each of dung and several fertilizers is in its tenth year. The yields show that we now have a great range of productivity potential and this is confirmed by analysis of an extensive series of soil samples. The relationship between the analysis values, treatments and crop yields is very striking and will be followed up in view of the absolute necessity to have such correlations before elemental soil analysis can be of any value in advisory work. There is evidence that cotton may respond to calcium on some of the Ukiriguru soils. This problem is currently being studied more fully.

METEOROLOGY

In a year of heavy rainfall, Nachingwea had its highest seasonal total for the 15 years during which records have been kept. The figure was 56.26 inches. Some further analysis of these records was attempted, particularly in respect of intensity. All falls were divided into 10 minute periods and the resulting rate expressed as inches per hour. The 1961/62 figures were compared with a five-year average. It was noted that one-third of the total amount fell at the half to one inch per hour rate, one-quarter at the one to two inches per hour rate and only one-tenth of the total amount fell at a rate exceeding three inches per hour. There is a tendency for the high intensities to occur more at the beginning and the end of the season than in the middle. Although the number of high intensity falls is lower than might be expected the importance of one or two heavy falls early in the season on bare land is considerable.

SOIL STUDIES

A start has been made on a detailed survey to determine optimum land use on south and east Kilimanjaro.

Some further studies were made on the Tengeru run-off plots which were originally laid down in 1952. It is clear that the unprotected continuous maize plots and the clean coffee plots have the highest soil and water loss. If it is assumed that under the best treatment (Rhodes grass) there has been no loss in minerals, the clean coffee plot lost one-third of its total phosphorus and three-quarters of its organic phosphorus in 10 years.

IRRIGATION

No major investigation was undertaken but samples were analysed in the laboratory from the sites of many prospective schemes. At Kilingali dangerous salt concentrations were noted in the sub-soil and care will be needed if this scheme goes ahead. The Kitibo pilot scheme showed no sign of salt trouble and appears to be a very good prospect.

ENTOMOLOGY

TERMITES

The trials in chemical control of termites, begun in 1959, continued, but were divided into two aspects. In addition to the insecticide work an attempt was made to study the factors which influence termite attacks.

The residual effects of 1961 soil applications of insecticides were still apparent but obviously decreasing, the losses on the control plots in this experiment are also getting less which leads to the suspicion that the treatments have generally reduced the termite population in the area of the experiment. In a new experiment on soya beans a seed dressing containing 75 per cent dieldrin active ingredient was better than one containing 60 per cent. A rate of 0.1 oz. per 1 oz. of seed (0.15 lb. active ingredient per acre) gave increases in soya yield up to 250 lb. per acre.

There were no flea beetle attacks on sesame so termite studies could be carried out without this complication, but in this season sesame was not attacked by termites either.

From general observations on the termite problems, which included fibre determinations and soil moisture measurements, it was concluded that damage tends to occur more during dry spells. Soya is generally attacked earlier in stage of growth than maize and this is possibly tied up with the fact that the fibre content of the stem increases much more rapidly with age in soya than it does in maize.

ARMY WORM

In collaboration with the entomologist from the Commonwealth Pool stationed at Muguga, light traps have now been established at all Research Centres and regular records of catches are sent to Muguga. There were no major outbreaks of the pest during the year.

INVESTIGATIONS OF LOCAL INTEREST

At Mtopwa further progress was made in adapting our programme to a study aimed at improving existing agriculture instead of trying to impose a completely new system. The experiment on land use has been mentioned under soil fertility and it is intended in the future to start a series of trials on the method of cropping. The observations which were started last year as a preliminary to formal experimentation were continued. Once again the traditionally sown plot tended to out-yield in terms of total produce the pure stands which we planted alongside.

In general flat plantings out-yielded those on the ridge. This confirms numerous results on several crops over the past few years.

Other work which has previously been reported under this section will now be considered under the respective crop heading.

ANIMAL HUSBANDRY

It has been noted that control of this work passed from the Veterinary to the Research Division during the year. Projects have the same practical bias as is given to the agronomic programmes. There are studies of breed improvement, development and comparison. Feeding trials include lactation and suckling, grazing and supplementary feeding and water deprivation. Mating practices, growth and carcass composition complete the field.

DAIRY AND DUAL PURPOSE CATTLE

In the coastal areas around Tanga progress has recently been made in improving livestock husbandry for milk production in conjunction with improved maintenance of coconut plantations. The Tanga Experimental Station will play its part in this development by provision of improved stock and studies of better grazing practices and coconut palm management. The project will be based on a Zebu-type dual purpose cow and "Mpwapwa" cattle are to be used. Since the station is no longer to be an intensive dairy unit the *Taurindicus* herd will be moved. Comparisons to be made at Mpwapwa and Tanga between "Mpwapwa", Boran and Jiddu cattle will determine whether to amalgamate these breed groups. Information to date suggests that all three are similar in their ability to produce a fair proportion of heifers yielding 3,000 lb. and some older individuals giving 5,000-6,000 lb. in 305 days.

Development of "Mpwapwa" breed has continued to be the major project at Mpwapwa. Fairly large multiplication herds have been established at Ukiriguru and Seatondale with smaller ones at other sub-stations. Twelve bulls per year are now being test-mated at Mpwapwa and fifty have been tested in the past six years.

Progeny test results from four bulls of the last Red Sindhi importation have been disappointing by comparison with concurrent "Mpwapwa" bull mating results. Only one is being retained.

The project studying protein levels in dairy cow rations at Tanga will end in 1963. One group of animals has unrestricted controlled grazing and another a little grazing only at flush periods. Environmental studies at Tanga are concerned with the effect of shade, and the reduction of temperature stress by spraying with water.

In a calf-rearing trial at Tanga which ends in 1963 multiple suckling appears to be giving good results. "Early weaning" is promising but there is some difficulty in ensuring adequate consumption of solid food in the initial stages. The trial will be followed through to first lactation. Heifers from a similar trial at Mpwapwa in 1961 have yet to come into production.

BEEF CATTLE

Comparisons are being made between the merits of the Boran and the indigenous Shorthorn Zebu. Individually the Boran is the bigger and better animal, but other factors including mortality, fertility, mothering ability and seasonal flexibility are being considered. Early indications are that the faster growth rate of the Boran is more than compensating for a slightly poorer reproductive performance. The trial is being done at West Kilimanjaro and Malya and the margin in favour of the Boran is greater at West Kilimanjaro (25-40 per cent) than in Sukumaland (6-12 per cent). This may be a reflection of the herd age at West Kilimanjaro.

From a study of beef production per acre, there is a suggestion that 20-30 per cent more Shorthorn Zebu steers can be carried on a given acreage to give the same average liveweight gain per head as the Borans.

At Mpwapwa a comparison of growth rates between Boran, half-bred Boran $\times$ Shorthorn Zebu, "Mpwapwa", and Zebu Shorthorn shows that the "Mpwapwa", (approaching three years) still retain a small lead. With the addition of a further group ($\frac{1}{2}$ Aberdeen Angus- $\frac{1}{2}$ Boran) a similar experiment, under ranch conditions, will be started at Kongwa in 1963.

Some interesting points have emerged from work on water deprivation. Under ranch conditions of daily watering, average "store" animal requirements are 1,300 gallons per year. The figure becomes 1,100 gallons under more familiar conditions of increasing scarcity of grazing when longer walking distances reduce watering to every second or third day. Over a two and a-half-year period covering three dry seasons the water deprivation and extra exercise imposed during the dry season cost about 50 lb. of liveweight; or a loss of about 16 per cent growth potential when similar grazing is available to both water deprived and control groups. All animals voluntarily restrict water intake according to the availability of grazing. It is thus possible that a limited dry season grazing area might be rationed by water deprivation of the stock concerned.

Night paddocking, as against yarding, has had little effect on older animals but young calf development has been dramatically quickened. The post-weaning check has been greatly reduced. Calves with access to night grazing have grown twice as fast as yarded ones for the first three months after weaning and produced heifers 100 lb. heavier at two years, which could be culled one year earlier than usual. The lack of benefit to older animals may be due to habit since the practice has yet to be applied to beasts familiar with it since calfhood.

Castration of cattle has checked growth rates at all ages up to eighteen months but a very early operation (one week after birth) has not been tested. Where meat production is the sole and initial aim the data, though incomplete, suggest "the earlier the better". Two experiments comparing entire males with castrates in sheep and cattle are nearly complete. The matter is of importance to the experimental programme for there is a conflict between the use of relatively small numbers of "improved" male animals as potential breeders and for husbandry experiments. In sheep the value of ewe lambs is being considered for meat production experiments.

Reproductive physiology studies have been directed towards defining the natural initiation of sexual cycles in Zebu-type heifers and the interaction of these with seasonal effects.

Trials have begun to determine the benefits of feeding cheap nitrogen supplements, such as urea, to combat the low protein values of dry season grazing.

SHEEP

While Blackhead Persian sheep remain the principal breed under development a small flock of Masai sheep is being multiplied at Ilonga.

With the closure of West Kilimanjaro the majority of the sheep work has been transferred to Malya but part of the flock has been moved to Kongwa. Some of the latter are to provide a supply of pure-bred rams for issue and the remainder for a cross breeding trial aimed at the production of improved lamb carcasses.

A trial to evaluate the normal practice of withholding early morning grazing suggests that the practice is detrimental because the reduction in grazing time is more important than any increase in parasite infestation to which longer periods on pasture may lead. There has so far been no appreciable difference in helminth infestation between the two groups but the general level is now high following the heavy 1961-62 rains. Neither group has been dosed since the beginning of the experiment at weaning.

Large growth increases (40-100 per cent) have been recorded by supplementary feeding of ewes and lambs during the last few weeks of suckling and continuing to feed the lambs into the dry season. But the cost of the supplements exceeded the value of the lambs. The work is being continued by confining the extra feeding to the lambs, for four weeks before and four weeks after weaning. The conflict between the need to "do the lambs well" and that to maintain breeding frequency is also being studied.

GOATS

Results are disappointing. Heavy mortality has removed all the advantages of better carcase production and higher fecundity of pure-bred Boer goats. Attempts are being made to develop an improved general purpose meat goat which will have the better carcase of the Boer crossbred and the essential hardiness of the Kamorai crossbred. A trial comparing various levels of Boer crossbred with indigenous animals is now drawing to a close at Mpwapwa.

Studies have been completed on both sheep and goat carcasses to derive a technique for estimating total carcase composition from sample joints.

The accumulated data on sheep and goat liveweight increases show that the growth rate of young stock is very much slower in the second year than in the first. This suggests that the normal practice of only slaughtering mature animals is wasteful and that more efficient use of resources would come from killing lambs and kids at either six or twelve months.

PIGS

Work has been discontinued since it is considered of more immediate importance to use our resources on other classes of livestock.

POULTRY

The results of crossing trials using Rhode Island Red cockerels on indigenous pullets demonstrated the improved egg laying potential (30-50 per cent) of the crossbreds over the indigenous pullets under domestic farm conditions. The work also demonstrated the great need for improved elementary husbandry. Until the latter has been achieved there are no problems to justify the use of research facilities.

CROP HUSBANDRY

BANANAS

This very important and widely grown crop has hitherto been neglected as a research project, but information is being gathered to determine whether there are problems which would repay study. It is likely that improved planting material will produce the greatest dividends and there is now a collection of forty-one varieties at Muheza. A very good eating type (Jamaica A) is being bulked for distribution.

The coffee-banana complex continues to cause difficulties of problem definition. It has been established that interplanted bananas depress coffee yields but there is now evidence from Maruku that the opposite also occurs.

CASHEW

The small programme at Chambezi was reorganized. It is now concentrated on a study of fertilizer use and the possibilities of intercropping with coconuts.

The main programme continued at Nachingwea. Work on vegetative propagation has now stopped. It has been shown that air-layering is the only practical method and that this is not suitable for commercial use, though it may be of value in the experimental production of clonal material. It is clear that any issue of improved planting material must be by seed. No further observations were made on flower biology as it is considered that we now have sufficient knowledge for our purposes.

In the third season of recording yields from trees planted with seed of varying specific gravity, the continued superiority of the high specific gravity lines was maintained both in nut yield and girth. In the foreign collection some of the varieties are now giving yields very similar to those of local trees. There is so far no response, either as girth measurements or nut yield, from fertilizer application in the two experiments which are studying this.

In an establishment trial intercropping with soya beans gave considerably faster growth than no cultivation, or with applications of mulch or farmyard manure.

The analysis of yield data from one experiment suggested a negative correlation between yield in pounds and nut size. This confirms field observations to the effect that a heavy fruit set per inflorescence gives a large number of small nuts.

Preliminary surveying and collection of data from the Lulindi scheme continued and spraying will start in 1963. It is not intended to carry out any further formal spraying trials on *Helopeltis* control. It is, however, intended to restart routine collection of records on the incidence of the insect. The occurrence of a population peak in July was not in keeping with expectations from past records. It now seems likely that *Helopeltis* populations are not governed entirely by the desiccating conditions of the dry season.

In an establishment experiment grass cutting and dusting both gave a large growth response when applied separately and a slight positive interaction when carried out together.

Further survey work showed the continued incidence of *Pseudotheraptus* damage to the kernels. A preliminary spraying programme is planned.

A suggested method of producing improved seed fairly quickly has been discussed and the initial selection work is to be done in 1963. The characters sought will be high yield and early maturity of the crop.

COCOA

In an observation at Bondei there are large girth measurement responses to fertilizer; probably due to phosphate. An N.P.K. experiment has been laid down at Mangubu.

COCONUTS

A study of flower behaviour and nut formation over three and a half years on a group of trees at Chambezi has been completed. It is notable how few "vidaka" form mature nuts. This does not seem due to water stress because shedding is greater in wet weather. It is possibly a nutrient shortage. Fertilizer and cultivation studies are in progress at Chambezi but the palms are not yet in bearing.

COTTON

Research continued to provide data which can have immediate practical application towards the further improvement of the country's second most important crop. The work was, as usual, carried out by the staff of the Empire Cotton Growing Corporation and is fully reported in publications of that body. Only a brief note of the highlights is given here. A most encouraging feature was the successful adoption by farmers in parts of the Eastern Region of cultivation and spraying recommendations based on experimental results obtained at Ilonga.

The standard fertilizer recommendation in the Lake Region is 1 cwt. per acre each of sulphate of ammonia and double superphosphate (40-42 per cent P_2O_5). In an experiment at Ukiriguru 1 cwt. of diammonium phosphate gave similar results to this mixture, but the same quantity of monammonium phosphate gave only half the yield. A comparison of urea, calcium nitrate and sulphate of ammonia at similar rates of nitrogen showed no differences. The variety $\times$ ridge interaction noted in 1961 was not present. There was little yield difference between three and five foot ridges. The collection of water requirement data was continued. This will be of value in irrigation schemes.

An early planted, sprayed demonstration plot at Ilonga yielded 1,334 lb. of seed cotton per acre whereas an early planted unsprayed plot gave 142 lb. and a late planted unsprayed plot 38 lb. At Ilonga there was again no response to fertilizer, but the mean response over five experimental sites at Ulaya was 40 per cent for 1 cwt. of sulphate of ammonia or 1 cwt. superphosphate per acre. There was no additional response from applying both together.

The proposed Uk 62 seed issue was bulked on Ukiriguru. This was the first time the initial bulking of a new issue had been made on the station. The advantages of continued close observation of the material were noted. The issue is intended for the Lake shore and northern parts of the Region, having a higher yield and greater bacterial blight resistance than either Uk 55 or Uk 58. For the harder climate of the south concentration is upon yield and ginning percentage. A Uk 63 issue is expected to raise the yields of this area by 20-25 per cent. Investigations have started to obtain a greater understanding of the behaviour of multiline varieties. Growth rate and fruiting studies have already shown that considerable variation is available which could be important in determining the composition of issues to varying environments.

In the Eastern Region IL 62 continued to out-yield IL 58. Over nineteen sites it gave a mean increased lint yield of 15 per cent. An initial multiplication was made. In the Northern and Tanga Regions the mean data from seven experimental sites also showed IL 62 superior to IL 58. Combining ability trials at Ilonga show little hybrid vigour in the F_1 . Four modal bulks have been set up at Ilonga. One is selected only on lint length. It is hoped that this factor will be improved and opportunity will also be taken to determine the effect of selecting for one character on others. Work on U.P.A. material indicates that considerable variability is available for future selection.

A trial in the Rufiji delta gave good yield results but produced cotton of a type more akin to that of Egypt and the Sudan than normal Tanganyika.

Fusarium wilt continued to spread slowly in the Lake Region. New, widely scattered, foci were established up to forty miles from the Lake. It has been demonstrated that infection can be spread by the husk. A satisfactory glass-house technique for evaluating resistance has been developed and has revealed a high heritability in one family of Albar hybrids. There is a suggestion that dressings of dung and superphosphate inhibit the establishment of the fungus in the soil.

At Ukiriguru a glass-house technique has been established for testing naturally occurring populations of *Xanthomonas malvacearum*. Clear indications of degrees of virulence on differentials are to be tested in the field. At Ilonga the growth of seed from bolls showing no signs of bacterial blight produced 22 per cent of infected seedlings.

A study of the biology of American and Spiny Bollworms was begun at Ukiriguru. It was shown that both species are heavily parasitized and that insecticide spraying upsets these relationships. Spraying is not a general recommendation in the Region. Previous experimental results have been variable and it is hoped that the present work will provide a more precise basis on which to make recommendations. In a spraying trial D.D.T. at 1 lb. active ingredient per acre provided good control of American Bollworm but Sevin (1.5 lb. active ingredient per acre) and Toxaphene (3 lb. active ingredient per acre) were relatively ineffective. At Ilonga the necessity to spray for high yields was again clearly demonstrated. Spraying was not economic on sites in the Northern Region.

COFFEE

Arabica

The main part of this work will be dealt with in reports issued by the Coffee Research Station, Lyamungu. Brief notes will be given here of progress on the sub-stations.

In a series of copper spraying trials response was slight at Maruku, good at Kituntu and very substantial (over 300 per cent) at Ngara. In a pruning trial at Maruku, on 1957 planted trees, multiple stem is now better than local pruning; this is a reversal of previous responses.

At Mbimba there was a notable improvement in general standards, with an overall mean yield of 7.29 cwt. clean coffee per acre (1961 3 cwt. and earlier years similar) and 16.1 per cent of the crop fell into Class 2 which is the first time such a high rank has been achieved. This progress illustrates what the adoption of sound known cultural practices can achieve in the Mbozi area. The oldest block of coffee on the station gave a mean yield of 20.21 cwt. per acre but showed little response to irrigation. The hedge planting yielded well and for the first time responded to irrigation (22.65 cwt. against 4.04 cwt. per acre). Mulch out-yielded dung in the fourth year of another experiment and reversed the 1961 results. In the second year of an experiment testing applications of lime in the planting hole, considerable responses (1.25-6.73 cwt. per acre) were obtained. Over a series of district plots copper spraying generally doubled yields.

In a variety trial at Ng'amba estate N39 is leading over eight years. P280/21 has continued to do well both at Ng'amba and Mbimba.

A comprehensive series of trials is now under way at Mitalula in a study of responses in the Rungwe environment.

Robusta

The work is all done in West Lake Region and based at Maruku. In the fourth year of the establishment trial dung considerably increased yields without lime, but not so much in its presence. Fertilizers showed little response. The experimental mean yield was 735 lb. clean coffee per acre. The use of mulch and nitrogen continued to increase considerably

yield of mature coffee, but there was no response to nitrogen and potash in the first year of a new experiment. In a demonstration there was no difference between planting into a prepared hole and into the undisturbed soil, unless dung was put in the hole; then the response was substantial.

A modified system of multi-stem pruning gave yields comparable to the local system and both were better than either single or conventional multiple. In variety work some Uganda types yielded more and bigger cherries than local.

GROUNDNUTS

With mean yields around 700 lb. of kernels per acre there were no responses to dung or fertilizers. At Suluti yields declined with delay in planting from the beginning to the end of January. Mwitunde and Natal Common behaved similarly, with top yields of around 1,000 lb. kernels per acre, but the Songea local seed maintained its yield better with later planting.

Trials of pale-skinned selections from the Mwitunde variety continued at Nachingwea. In the second season of a formal experiment the best strains in 1961 were again good performers. Over a yield range of 609 to 872 lb. kernels per acre the original Mwitunde was placed nineteenth out of twenty. The continued yield superiority of the selections is an interesting side-line result from a project started to produce a more acceptable nut for the trade.

At Ukiriguru Aldrin as a seedbed dressing tended to increase yield but not population. Four Rogor sprays at Urambo considerably increased yields, Mamboleo from 510 lb. to 927 lb. and Mwitunde from 208 lb. to 659 lb. kernels per acre.

HARICOT BEANS

Several of a number of varieties planted at Karangai gave yields comparable to their performances at Tengeru. From the bulking up of rust resistant lines at Tengeru numbers 8 and 16 were released. The latter has been particularly well received by the trade. Growth of the variety Herbert Sproget from Nyasaland seed, at Tengeru produced a rather poor yield. The rust nursery work continued.

HIBISCUS (KENAF)

The fluctuating interest in this crop over the past few years was stimulated by the possibility of a large production unit being set up in the Kilombero Valley. A programme was started at Ilonga to improve yield and processing quality by plant selection and better cultural methods. E.C.R. material has always been superior to either Laos or Cuban and is now in sole use. Yields declined rapidly with later planting both at Sanje and Ilonga. Unthinned stands yielded poorly but close regular spacing was beneficial (12"×9" out-yielded 24"×9"). Sanje produced the better crop with the best treatment yielding at the rate of 1,658 lb. clean fibre per acre, and a generally higher fibre to green stem ratio. The trade spoke highly of the fibre and valued it at £80-£90 per ton.

It is clear that the seed stocks are very mixed. This leads to poor field and processing performance. Furthermore, the simple collection of seed from unrogued crops over the past ten years has probably led to unconscious selection for seed production. This is likely to be antagonistic to fibre production. With a view to expanding the programme in 1963 about a thousand plants of promising appearance were seld during the season.

The crops suffered attacks by numerous insect pests but it is not clear what effect these had on yield. Some diseases were noted but none was epidemic.

Interest in developing production in the Northern Region continued and two acres of E.C.R. material planted below the Rift in Mbulu produced 3,000 lb. of clean fibre which sold for £75 per ton. Considerable information has been gathered on the commercial problems of cutting and processing.

An observation plot at Mbozi grew poorly and produced only 666 lb. of clean fibre per acre.

MAIZE

Where time of planting was tested the results were generally in accordance with previous findings. The spacing × time of planting interaction noted in 1961 at Ilonga did not recur. The variety No. 1, White Dent, which had in one season given a relatively good yield from

late planting again failed to repeat this effect at either Suluti or Nachingwea. At Ukiriguru M 6 and M 31 declined less with late planting than Katumbili but were inferior to it in actual yield at all dates. At Suluti, Katumbili and the Songea local variety yielded well.

An imported hybrid, Diacol H 352, heavily out-yielded Katumbili at Ilonga, and it is thought that its components may be very useful to us. The breeding work at this station progressed and the 1960 selections were selfed twice more. Top crosses $\times$ Katumbili and Zanzibar Yellow were made for testing in 1962. The aim is the production of a synthetic with six to eight inbred components.

At Tengeru the initial issues of M 6 and M 31 were withdrawn, reselected and limited new issues made. Both varieties again yielded well in comparison with local material at four sites. This was particularly so at Karangai, where local crops failed due to the drought. The selection of inbreds from M 6, M 13 and M 31 continued with a view to the production of a synthetic. An arrangement made to import a range of basic material from Mexico and Colombia is expected to be of great benefit.

Streak disease is not normally noticeable in this country but infection was widespread in 1962. This may have been due to abnormal rains in the 1961 "dry season" which better sustained the indigenous grass hosts. An attempt was made at Ilonga to ascertain the effect of streak on grain yield. One thousand plants each from Katumbili and Eckstein bulks were classified according to degree of infection at tasselling and individual cobs later weighed. Yield was little affected up to 25 per cent of leaf area infection. With further infection there was a significant (P.O. 01) reduction in cob weight. But even plants with 100 per cent leaf infection yielded 60-70 per cent of the grain given by unaffected plants.

PASTURE

At Nachingwea a nine acre Rhodes grass pasture has now carried the equivalent of one store beast per acre for the whole twelve months without supplementary feeding over the past five years.

Eighty per cent of the original single plant Rhodes selections at Tengeru have been discarded. Some very promising material remains. Similar work has started with Cenchrus and Setaria.

A number of experiments on improved pastures at Kongwa have been based on Cenchrus ciliaris because of its ease of establishment, the botanical stability of the pasture and an even yield pattern. Experiments with pelleted seed, to try and overcome the bottleneck of having to sow large areas in the short climatic spell optimal for ordinary seed, were disappointing. Responses to applied nitrogen only occur in years of above average rainfall. But there is evidence that application of nitrogen just before a hay cut will increase the protein content of the material.

There is no evidence that topping Kongwa pastures has any merit. But it is suggested that Cenchrus does not like being burnt. Cenchrus is much more persistent than Rhodes grass; the latter practically disappears after five years.

Seed of both Cenchrus and Rhodes grass has retained a reasonable germination capacity for up to six years. Seed harvested a little immature has a better initial germination but does not keep as well as that gathered when fully ripe. Soil moisture studies have confirmed the large water requirements of permanent pastures. The profile is tapped down to seven feet and use goes up with increasing age of the pasture.

Rotational grazing at Kongwa increased the number of grazing days but at Ukiriguru continuous grazing gave 50 per cent more liveweight gain than rational grazing when compared at a fixed rate of stocking. The Ukiriguru work has been largely on the hardpan (Itogoro) soils and has clearly demonstrated the improvement in ground cover and species composition can be brought about by better management. Rhodes grass has been difficult to establish and shown a very poor persistency. Attempts to establish Elephant grass on these soils have failed.

In the living herbarium on Ukiriguru Hill sixty species have now been identified and named.

A number of observation plots were planted at Mwamala and Molopo. Cenchrus has grown particularly well. Appearances suggest that some pasture improvement is badly needed in this area. Some fodder trees have also been planted.

Mbarali Irrigation Scheme. Unusually severe floods experienced during the year again caused anxiety as to the effect these would have on the river meanders and particularly on the headworks of the intake to the main irrigation channel. While some damage to the river banks took place upstream of the headworks, it was not excessive and only minor protective works were necessary. A problem has however been created by heavy silting at the entrance to the headworks and methods of overcoming this are being studied. Responsibility for the running of the irrigation scheme lies with the Tanganyika Agricultural Corporation, but the W.D. & I.D. provides technical advice on engineering problems. During the year this included the construction of a syphon under a service road, and a foot-bridge across the main channel. 505 acres are now under cultivation, both directly by the Corporation and by tenant farmers.

Kalenga Irrigation Scheme. Repairs to the severe flood damage to the main channel caused in the previous year were put under way. These consisted of culverting 830 ft. of the main channel where bank subsidence was likely and the replacement of a stream over-crossing by a 2 ft. dia. syphon, 90 ft. in length. At the end of the year the work was practically complete.

Ilonga Irrigation Scheme. A 3,000 cusec flood in April demolished the rubble masonry breaching section of the weir. This was replaced by a gabion structure which has so far withstood heavy flooding. At the end of the year the pipeline from the weir to the small irrigation experimental plot was completed and is now in operation.

Mlali Irrigation Scheme. The continuance of high floods over 1961/62 caused damage to the regulator in the river and washed away the right bank bund immediately upstream allowing the flood water to flow directly on to the irrigation area, ruining some of the paddy crops and depositing a large amount of sand and silt in the area. Extensive repair and improvement works were carried out to the regulator and to the right bank and these were completed by the end of the year. A flood protection bund and drain was laid along the right bank of the river between it and the irrigation area, and this work was also finished at the end of the year. This irrigation scheme continues to be popular and the possibility of extending it, which will require a search for an additional water source, is being considered.

Mbarika Pilot Irrigation Scheme. In conjunction with the Government of Israel and the Victoria Federation of Co-operative Unions, 40 acres of land were selected close to the south shore of Lake Victoria, and works for a pumped irrigation scheme, using the waters of Lake Victoria designed. Water will be led on to the fields by gated pipes laid on the surface and there will be a small experimental plot for overhead sprinkler irrigation. The work was completed most expeditiously to enable the farmers to plant cotton in December. It was not necessary, owing to the heavy rains, to irrigate at the time of planting, but the use of fertilizers has already shown encouraging early results in the growth of the cotton. If this small pilot irrigation scheme is successful, it is proposed to try out similar schemes in other parts of the lakeside area.

Mkundi River Training Works. Some damage to the earth embankment on top of the gabion training wall forming the left bank of the river was sustained during severe floods. The earth bund was repaired and the opportunity was taken to strengthen the gabion wall and extend it. Some 3,000 cu. yds. of rock in gabions were placed, and a further 1,000 cu. yds. collected and laid beside the wall for emergency repairs. Training fences are being erected in the river in a further attempt to keep it on a definite course and encourage deposition between the fence and the gabion wall.

Mbuguni Flood Protection Works. After the severe damage caused by the 1961 floods, reconstruction was put under way and completed during the year. The works consisted of laying a 3 ft. dia. Armco culvert 80 ft. in length, with penstock, trash grill and downstream measuring flume. Pitched protective works were carried out on the right bank of the river. The increased size of the culvert allows for a flow up to 100 cusecs and as the area commanded is very popular, increased areas under irrigation are expected.

Kinyasungwe River Flood Control. No new flood control works were carried out during the year, but improvements to three existing flood control dams at Dabalo, Hombolo and Buigiri were necessary. These three dams, together with Ikowa, play a major part in storing flood waters of the Kinyasungwe River at a critical time and prevented the almost-annual washing away of main roads and railways.

X.—DAM CONSTRUCTION

73. The year followed almost exactly the pattern of 1961, with floods throughout the whole country and famine in the drier central regions. The unusually heavy rains at the end of 1961 carried over into 1962 and, in combination with insects, ruined this Year's crops in parts of the country. Famine relief works were however confined this year to communal Nation Building projects, including small hand-built dams, and the larger dams were constructed solely by machinery. The two successive years of famine have been a drain on the resources of local authorities and little money has been available for water supplies generally, and dams in particular. As a result there was a decided drop in dam construction, and only 9 dams and reservoirs were completed, involving 319,200 cubic yards of earth placed and resulting in an increase of 1,011 acre ft. in water storage capacity.

74. No additional earth-moving machinery was purchased and the earth-moving teams consist of; one team of 3-Caterpillar D.W. 15s push-loaded by 1-Caterpillar D.8 and 1-Caterpillar D.7, two teams of 5 and 4 Tournapull D Roadsters push-loaded by Caterpillar D.7, and 5 teams of Caterpillar D.4s. The integration of the Soil Conservation Unit into this Division meant an additional 2 Track-Marshalls and scrapers for the D.4 teams.

75. All dams constructed are detailed in Appendix I of this report. In the following paragraphs a brief description is given of points of interest of some of the larger dam works carried out during the year.

Igombe Dam. The 1961 floods which caused such severe damage to the spillway of this dam, Tanganyika's largest with a capacity of 38,500 acre feet, continued well into the, beginning of the year and it was impossible to survey the damage and prepare designs for the repair until April, leaving very little time before the remedial works could be finished to deal with expected floods at the end of 1962. The designs were completed and a contract to the value of £65,000 awarded in July. Although preliminary progress was unsatisfactory, work proceeded at a reasonable rate thereafter, but unfortunately early floods started in November and practically all work in the spillway had to stop. The floods at the end of 1962 have almost reached the same intensity of those in 1961. Additional works on the down-stream side of the main outlet canal were completed and it is now possible for the sluice gates to be fully opened without causing damage downstream.

Matambulu Dam. This dam was breached in 1961 as a result of a combination of an insufficiently compacted core wall of poor material and an undiscovered deep-seated spring. Work on repair started during the year and was almost completed. The spring was sealed off and led downstream and a new cut-off wall excavated and refilled with an impervious core material, moistened and rolled to specification. The main embankment was then rebuilt and 31,500 cubic yards of material placed.

Dabalo Dam. A small slip took place in the downstream face of the embankment necessitating the installation of a drainage system which proved effective, and the opportunity was taken to construct a new guide wall to the spillway and a permanent outlet channel from the draw-off tower.

Wiyenzele Dam. Work re-started on this 920 acre ft. capacity dam, 1,400 ft. long and 38 ft. high, after the cessation of work by flooding in 1961. 88,000 cubic yards of material were placed in the embankment, including the impervious core. Concrete crest walls were built in the spillway, also masonry and concrete drop walls in the spillway tail. However, a severe storm in the catchment caused an unexpected rapid filling of the dam basin, a weakness was found and the embankment was breached. Investigations were put in hand immediately to discover the cause of the failure.

Dams in Lake Region. Small dams continue to be very popular in this area and during the year work was under way on 9 dams and 4 charcos with keen demands for more. While not having the glamour of the larger dams, these small, strategically-spaced dams, are gradually building up an overall cover of permanent water supplies throughout the whole Region. The policy of smaller but more frequently spaced dams for cattle and domestic use is strongly advocated by this Division as the question of control of cattle and soil erosion becomes so much easier to deal with.

XL.—WATER BORING

76. Geological-geophysical surveys for borehole sites were carried out in all Regions except Western, Southern Highlands and Southern, as follows:—

Central	...	...	...	...	...	11
Eastern	...	...	...	...	...	4
Tanga	...	...	...	...	...	5
Northern	...	...	...	...	...	7
Lake and West Lake	...	...	...	...	...	11
Total						38
						Surveys.

77. Of the total number of surveys, 25 were undertaken for Local Authorities, District Councils, and National Building (self-help) schemes; one for Wami Prison and one for the Agricultural College in Eastern Region, Morogoro; one for the Mkomazi Game Reserve in Tanga Region and one at Seronera Camp in the National Park. For private clients eight surveys were carried out, comprising two for Sisal Estates in Tanga Region, two for Missions in Lake Region, and four for other private estates in Northern Region. One exploratory survey was performed across the Makatupora Depression, the source of Dodoma's water supply, in an attempt to elucidate its structure and the depth of the over-burden.

78. From the above it can be seen that 65.8 per cent of the surveys were carried out for Local Authorities, 10.5 per cent for Government Departments, 5.25 per cent each for Sisal Estates and Missions and 10.5 per cent for other private clients.

79. The total number of resistivity depth probes during the year was 271, with the depth-range from 150 to 700 feet, and 15 constant-separation traverses totalling 38,170 feet were traversed, sounding strata at constant depth between 100 and 200 feet.

80. Geophysical forecasts were found to be in general agreement with the drilling results. Of 23 holes completed 17 were put, or are awaiting to be put, into commission which makes the rate of success 73.8 per cent. Borehole 35/62 still being drilled, and a replacement for Borehole 5/61 drilled in 1962 are not included in the rate of success. Of those abandoned, two holes (1/62 and 28/62) were dry, three holes (3/62, 4/62 and 17/62) met insufficient yield for the needs required and one hole (29/62) struck 216 g.p.h. of brackish water. The twice unsuccessful drilling at Mipa which struck fresh granite at 27 ft. probably resulted from misinterpretation of survey evidence.

81. Exploratory drillings were carried out at Kidunda in Eastern Region and at Jangalo in Central Region, both for proposed dams. With the Percussion Rig seven holes 6" diameter totalling 280 feet were drilled and with the Soil Sounding and Boring L.W. Rig, 77 feet were drilled. The Diamond Rotary Rig was operating in 29 holes totalling 106 feet drilled through over-burden and 1,001 feet drilled through Usagaran foliated gneisses and Jurassic shales, mudstone and sandstone. The overall core recovery from the latter two formations was 49.4 per cent. For the first time all exploratory holes were subject to permeability tests under falling and/or constant water head, which appeared to be a desirable and very useful supplement to the sounding of the strata condition.

82. The total footage drilled for water supplies was 5,867 feet including 112 ft. of replacement drilling (5/61). Of this 3,654 were drilled in successful holes. The length of casing inserted into producing holes was 309 ft. of 8" and 2,725 ft. of 6" diameter. Six holes were gravel-screened to exclude silting. The output of footage drilled in various Regions was: in Central 1,751 ft.; Lake 1,128 ft.; West Lake 1,200 ft.; Eastern 1,309 ft. and in Tanga 479 ft. The total yield from successful boreholes was 28,835 g.p.h.

83. *Groundwater Geology.* The granitoid Shield's top weathered zone gave good yields of about 1,500 g.p.h. to two boreholes (32/62 and 33/62) in Iramba area and to two boreholes (19/62 and 20/62) in Maswa area, medium yields of 250/560 g.p.h. were obtained elsewhere. The terrestrial cemented deposits 90 ft. thick pierced through at Mtita south of Dodoma (1/62) appeared to be drained.

84. Good yields were struck again in weathered gneisses of the Usagaran System in the notable area east of the Busi-Chungai fault in Kondoa area. However, drilling into weathered biotite-hornblende gneisses north of Lushoto within the Usambara Mountains produced only a trickle of water, presumably being drained by some camouflaged fault.

85. Nyanzian Schists produced good supplies of 1,500 g.p.h. in two boreholes one on Iramba Plateau (5/62) and one in Maswa area (34/62).

86. Soft phyllites of Karagwe-Ankolean System appeared again to provide chancy and risky aquifers by yielding only scanty water to two holes. However, borehole (17/62) drilled south of Kyaka struck 1,320 g.p.h. in jointed hard shales overlying soft (water tight) phyllites.

87. Calcareous shales sandwiched between thin beds of fine grain sandstone and thin beds of limestone of the Jurassic System gave disappointing though useful yields of 200/300 g.p.h. to three fairly deep boreholes.

88. The marine Tertiary deposits at Kipumbwi (2/62) south of Pangani produced 9,000 g.p.h. of good quality water.

89. One borehole drilled into Quaternary alluvium consisting of clays intercalated with lentils of sands and gravel on the north-west fringes of the Kimamba Flats at Mvomero struck 3,000 g.p.h.

90. *Quality of Groundwater.* Most of the water abstracted during the year was potable and only one hole was abandoned due to high salinity content. High total dissolved solids of 5,442 p.p.m. and an excessive total hardness of 1,500 p.p.m. were recorded on water from Saga-Saga borehole only, drilled into Jurassic calcareous shales. Fluoride content, apart from three holes at Kinampanda on Iramba Plateau, at Sayu-Sayu in Shinyanga and Nyakato near Mwanza where it was noted to be 4.0, 5.0 and 4.8 p.p.m. respectively, did not exceed 2.0 p.p.m. Water from Choda borehole in Singida area showed 143.0 p.p.m. of nitrates, trace or nil being recorded for all other waters.

XII.—PLANT AND WORKSHOPS

91. The shop maintenance of mobile plant and vehicles has now been handed over to the Electrical and Mechanical Division of the Ministry of Communications, Power and Works, with the exception of Central Region where the mechanical amalgamation has not been implemented yet, and maintenance will remain under Divisional control until June next year. To facilitate fabrication of small items and sundries for water supplies and irrigation schemes all Regional offices continued to maintain small workshops of their own.

92. On the 31st December, 1962, the W.D. & I.D. earth-moving fleet consisted of the following teams:—

(a) Four Caterpillar D4 tracked teams 3-6 units in each, equipped with 4 cubic yard scrapers operating in the Northern, Western, Eastern and Tanga Regions.

(b) One Caterpillar D7 tracked team with 9-13 cubic yard scrapers, in the Central Region.

(c) Two teams of Tournapull Model "D" 7 cubic yard wheeled Tractor/Scrapers, 4 and 5 units each team, with 1 and 2 Caterpillar D7 Bulldozers for push-loading, in the East Lake Region.

(d) One Caterpillar DW.15 wheeled team of 3 machines with 13 cubic yard scrapers and one D8 Caterpillar Bulldozer for push-loading, in the Central Region.

(e) In the latter part of the year the Division acquired a team of 5 Marshall Crawlers with 6 Preco Terracers and 2. Onions 4 cubic yard scrapers from the Mechanical Services Unit, Tengeru. Apart from the above equipment, there is a number of Caterpillar D4 and D2 Tractors in use in various parts of the country, and a 955 Model Caterpillar Traxcavator in Tanga Region.

93. The total quantity of earth moved mechanically in construction of earth dams and irrigation projects in 1962 was 319,200 cubic yards, compared with 362,500 cubic yards in 1961. The reduction in output is attributed mainly to scarcity of funds and a prolonged and unusually intensive rainy season.

94. The process of replacing unserviceable fixed body load carriers and short wheel base Tippers with dual purpose long wheel base Tippers was continued, and the Division took delivery of 9 long wheel base Tippers in 1962. Further, two Leyland Comet vehicles were received, replacing obsolete Thornycroft lorries used for drill rig towing and other heavy haulage, and orders were placed for five more with delivery scheduled early in 1963.

This would bring the total number of Leyland Comet 4×4 vehicles to eight, replacing almost completely the fleet of Thornycroft Nubians. A Leyland Super Hippo 6×4 heavy tractor ordered in September, 1961, has, due to numerous complications in manufacture, not yet been delivered. It is however now nearing completion, and should be ready for shipment in February, 1963; it will be used to haul an 18-ton Carrymore Lowloader for transportation of Caterpillar D7 Tractors.

95. The total number of accidents in which Divisional vehicles were involved in 1962 was 18, resulting in 4 deaths and 9 injuries. This compares with 19 in 1961, involving 3 deaths and 10 injuries.

96. A list of transport, contractors' Plant and earth-moving equipment appears at Appendix IV.

XIII.—MAINTENANCE OF LOCAL AUTHORITY WATER SUPPLIES

97. The standard of maintenance of the Local Authority water supplies continues to be with a few exceptions, unsatisfactory. The assistance of the Ministry of Local Government has been obtained in an effort to bring home to Local Authorities the fact that unless dams are maintained in good order they will be faced with large sums of money for their repair later on, or with compensation for damage caused through dams being breached leading to crops spoilation and perhaps loss of life. This Division instituted a routine inspection system for major dams, and these are now inspected at least once and where possible twice per annum, and a detailed report on their condition sent to the Local Authorities concerned. By detailing the matters which require attention some notice is being taken and remedial action started, but generally speaking the standard of maintenance of dams and other water supplies is deplorably low.

XIV.—CONCLUSION

98. Although some setbacks have been suffered during the year due to unfavourable weather conditions and other causes, the achievements and general progress recorded in the previous chapters can be regarded as very satisfactory. Of particular significance are the advances made in major project planning, the results of which are likely to be reflected in large scale construction projects in the near future.

99. Great credit is due to the staff, who have continued to display keenness and devotion to duty of a high order, and there is no doubt that the previous Director, Mr. I. L. Ward, who departed on retirement in May, would wish to be associated in this expression of gratitude to all ranks for their untiring efforts and loyal co-operation.

Dar es Salaam,
May, 1963

S. L. PATERSON,
*Director of Water Development
and Irrigation*

APPENDIX I

SUMMARY OF WATER SUPPLY WORKS CARRIED OUT IN 1962

Location No. Map. I.	Name and Location	General Description	Exp. during year
EASTERN REGION			
<i>Kisarawe District:</i>			
1	Project Planning Station, Ubungu.	Construction of rating tank	4,000
		Construction of two Student's quarters	3,300
		Alterations and additions to offices	1,500
2	St. Andrew's College Water Supply, Minaki.	Earth dam and pumped supply to College. Dam height 23', length 253', earthwork 4,600 cu. yds. capacity 40.4 acre ft. 4,790' of 3" dia. rising main to 20,000 gallon storage tank. Delivery 2,000 g.p.h.	2,706
<i>Morogoro District:</i>			
3	Mvomero Water Supply.	6" dia. borehole 205' deep, fitted with pump and engine. Output 3,000 g.p.h.	1,62
4	Saga Saga Water Supply	6" dia. borehole 400' deep, yield 240 g.p.h.	1,725
5	Gronero Water Supply	8" dia. borehole 366' deep, yield 320 g.p.h.	1,498
6	Mkulazi Water Supply	Drilling of borehole commenced First water at 205'.	470
7	Mngugo Water Supply	Drilling of borehole commenced.	—
8	Mlali Irrigation Scheme	Alternation to R.B. Abutment and channel diversion. Extension of stilling bay. Extension to flood bund and main drainage line.	3,324 700
9	Mtibwa Wells	Three wells for Forest Division 3' dia. and 15' deep.	215
<i>Kilosa District:</i>			
10	Gairo Dam	Earth dam for domestic purposes. Height 14', length 650', earthwork 8,000 cu. yds. capacity 1.7 ac. ft.	3,131
11	Mkono wa Mara Middle School Water Supply	Pumped water supply. 900 ft. of 1½" dia. pipe from well to 3,200 gallon storage tank.	202
12	Ilonga Irrigation Scheme	Alteration to weir on Ilonga River. Laying 1,800 ft. of 8" dia. steel pipe to carry ½ cusec.	973
13	Mkundi River Training	Conversion of gabion wall from light to heavy section, including additional protective gabions and earthwork on embankment.	9,000
<i>Ulanga District:</i>			
14	Construction of Automatic Recorder House at Swero	Job partially completed but work abandoned at onset of rains due to inaccessibility of site.	100
CENTRAL REGION			
<i>Dodoma District:</i>			
15	Dabalo Dam Improvements	Drainage works, spillway guide wall and Attendant's quarter constructed at this earth dam, which has a height of 48', length 1,400', earthwork 248,000 cu. yds. and capacity of 5,210 ac. ft.	4,564
16	Hombolo Dam Spillway	A new toe wall along the guide wall of the spillway, and a new crest wall at the tail of the spillway were completed.	1,738
17	Matumbulu Dam	Reconstruction of breached earth dam.	9,529
18	Mlowa Dam	Earth dam for domestic and cattle watering, height 33', length 1,900', earthwork 47,000 cu. yds. capacity 900 acre feet.	11,838
19	Wiyenzele Dam	Earth dam for domestic and cattle watering, height 38', length 1,385', earthwork 93,000 cu. yds. capacity 920 acre feet.	26,174
20	Buigiri Dam Improvements	Construction of new concrete crest wall, and Attendant's quarter.	1,104

APPENDIX I—*contd.*

SUMMARY OF WATER SUPPLY WORKS CARRIED OUT IN 1962

Location No. Map. I.	Name and Location	General Description	Exp. during year
<i>Dodoma District—contd.</i>			
21	Manchale Water Supply	Pumped supply from borehole to provide 13,200 g.p.d.	701
22	Kinampanda Water Supply	Pumped supply from borehole to provide 36,000 g.p.d.	817
23	Kelema Water Supply	Pumped supply from borehole to provide 17,400 g.p.d.	286
24	Igandu Water Supply	Pumped supply from borehole to provide 49,300 g.p.d.	984
<i>Singida District:</i>			
25	Itamuka Dam Repairs	Protective grass mat placed on u/s slope to resist erosion pending permanent repairs.	1,703
26	Puma Dam Repairs	R.C. key wall constructed, and additional spillway, in this small dam across bridge in an old railway embankment.	1,068
<i>Iramba District:</i>			
27	Ndago Water Supply	Pumped supply from borehole.	1,421
28	Kikongi Water Supply	Pumped supply from borehole.	689
29	Kiomboi Water Supply	Pumped supply from borehole to provide 72,000 g.p.d. to 10,000 gallon storage tank (and Minor Settlement) 9,200' of 3" rising main.	11,680
<i>Kongwa District:</i>			
30	Dossi-Dossi Water Supply	Pumped supply from borehole to provide 39,600 g.p.d. to 4,300 gallon storage tank.	1,401
WESTERN REGION			
<i>Nzega District:</i>			
31	Malolo Dam	Earth dam for domestic and cattle watering. Height 21', length 1,270' earthworks 48,000 cu. yds. capacity 580 acre feet.	2,285
		Construction of two 5,000 gallon circular cattle troughs.	1,872
<i>Kahama District:</i>			
32	Ifufumo Dam	Renovation of existing pipe line and construction of new cattle trough.	621
<i>Tabora District:</i>			
33	Igombe Dam	Levelling and repairs to spillway by direct labour, and extension of existing concrete overfall weirs from 100' to 240' by contract.	53,485
		Extension and improvement to outlet works.	3,790
LAKE REGION			
<i>Geita District:</i>			
34	Igalula Dam	Earth dam, 25,000 cu.yds. 1,550 ft. long, 15' high, impounding 123 acre feet for domestic and stock use.	5,970
35	Kitongo Dam	Earth dam 20,000 cu.yds., 1,155 ft. long, 18' high, impounding 40 acre feet for domestic and stock use.	6,307
36	Kamena Charco	Excavation 5,570 cu.yds. capacity 8 acre feet, incorporating a well. For domestic and stock use.	1,289
37	Mwingiro Charco	Excavation 5,570 cu.yds. capacity 8 acre feet, incorporating a well. For domestic and stock use.	1,252

APPENDIX I—contd.

SUMMARY OF WATER SUPPLY WORKS CARRIED OUT IN 1962

Location No. Map. I.	Name and Location	General Description	Exp. during year
<i>Geita District—contd.</i>			
38	Chigolwe Dam	L.B. spillway breach repaired and R.B. spillway reinstated. Earthworks 8,000 cu.yds. rock removal 400 cu. yds. masonry 200 cu. yds.	3,815
39	Mugando Dam	Syphon installed to assist flood discharge.	302
40	Geita Dam	Earthwork repairs to spillway on behalf of P.W.D. 3,000 cu.yds.	624
41	Katunguru Water Supply	Pumped supply from Lake Victoria, to provide 13,000 gallons per day 6,400 gallon storage tank and 8,310 ft of 3" to 1/2" piping.	7,564
42	Kamuhanga Dam	Work started on earth dam 37,800 cu.yds. 2,060 ft. long, 25' high, impounding 418 acre feet of water for domestic and stock use.	2,162
<i>Musoma District:</i>			
43	Rwamkoma Dam	Earth dam, 35,000 cu. yds. 1,310 ft. long, 19' high impounding 180 acre feet, for domestic and stock use.	6,523
44	Musoma Township Drainage Channel	18" concrete culvert 930 ft. long, in trench up to 17 ft. deep, to drain Kitaji area into lake Victoria Excavation and backfill 2,000 cu. yds.	3,702
45	Kirumi Ferry	Built up Ferry approaches on behalf of P.W.D.	711
<i>Kwimba District:</i>			
46	Magu Water Supply	13,500 gallons per day pumped from borehole to 5,000 gallon sump tank and 9,600 gallon storage tank, 8,835 feet of 2 1/2" to 1/2" piping.	8,451
<i>Mwanza District:</i>			
47	Fela and Fulo Charcos	Each charco 5,770 cu. yds. capacity 8 acre feet, incorporating a well, for domestic and stock use.	33c
48	Mbarika Irrigation Scheme	Pumped supply from Lake Victoria to deliver 223,000 gallons per day through 4,050 ft. of 6" piping to 50 acre pilot irrigation scheme.	6,262
<i>Maswa District:</i>			
49	Nhomongo Dam	Temporary bund across eroded spillway to impound water in dam.	217
50	Lalago Water Supply	11,000 gallon per day pumped from well in river to two storage tanks with combined capacity of 7,200 gallons, 8,700 ft. of 2 1/2" to 1/2" dia. piping.	6,333
WEST LAKE REGION			
<i>Bukoba District:</i>			
51	Divisional Depot	Construction of carpenter's shop, covered works bay, mason's yard and aggregate bay.	1,617
52	Rubale Pipeline	Minor improvements to intake.	17
53	Rubungo, Kamachumu and Rwamashenyé Water Supplies	Installation of automatic Water Dispensers in Water Selling Kiosks.	787
<i>Karagwe District:</i>			
54	Lwanyongo Borehole	Installation of Climax 9D hand pump, domestic point and cattle trough.	536
NORTHERN REGION			
<i>Arusha District:</i>			
55	Leguruki Pipeline-Kikatiti Branch	20,000 g.p.d. supply, two 10,000 gallon storage tanks, two cattle troughs, and domestic points. 23,500 feet of 2" dia. piping.	872

APPENDIX I—contd.

SUMMARY OF WATER SUPPLY WORKS CARRIED OUT IN 1962

Location No. Map. I.	Name and Location	General Description	Exp. during year
<i>Arusha District—contd.</i>			
56	Leguruki Pipeline-Sakila/ Matufa Branch	95,000 g.p.d. supply to Sakila/Matufa area. Two 20,000 gallon storage tanks, four domestic points and one cattle trough, 35,350 feet of 4"—4½" piping.	18,800
57	Mbuguni Furrow Intake	3' dia. Armco culvert, 80 feet long, with penstock, trash grill and measuring flume. Pitched protective facing 50 feet u/s and d/s.	1,139
<i>Kilimanjaro District:</i>			
58	Sholo Pipeline	Gravity pipeline, from Sholo Dam, 22,070 feet of 6"—3" pipe, 10,000 gallon storage tank, seven domestic points and one cattle trough.	48 7
59	Hulili Pipeline	20,000 g.p.d. supply to Hulili village from Mliri pipeline, 21,300 feet of 2"×1½" pipe, two 10,000 gallon storage tanks, five domes- tic points and one cattle trough.	49
60	Ukiyashi Pipeline	175,000 g.p.d. supply from dam to Uckira village, 37,354 feet of 4"—2½" pipe, eleven domestic points, one cattle trough, three 10,000 gallon, one 20,000 gallon storage tank.	1,442
61	Londorossi Pipeline Improvements	Improvement to existing scheme 300' of 6" pipe, twelve air vents and miscellaneous modifications.	482
62	Lyamungu Dam	1,000 cu. yds. earth dam to supply Coffee Research Station, 8' high, 190' long, storing 2.86 acre feet.	767
63	Mashati Maharosha Pipeline	57,600 g.p.d. supply from Mashati P/L Phase II, 13,362 feet of 4"—2" pipe, one 20,000 gallon storage tank and four domestic points.	4,661
64	Mlembea Ussori Pipeline	57,600 g.p.d. supply from Mlembea P/L. 14,450 ft. of 3" and 2" piping, and two domestic points.	4,528
65	Mlembea Olele Pipeline	57,600 g.p.d. supply from Mlembea P/L., 16,000 feet of 2½"—1½" pipe, two 20,000 gallon storage tanks, one cattle trough and eight domestic points.	7,164
66	Marangu Dispensary Pipeline	60,000 g.p.d. supply from Lower Sengia Spring, 7,400 feet of 2½"—1" pipe, one 20,000 gallon storage tank, and two domestic points.	3,664
67	Mkuu Mwatalene Pipeline	60,000 g.p.d. supply from Motale River, 16,800 feet of 6"—2½" pipe, one 20,000 gallon storage tank and eight domestic points.	6,427
68	Lowati Pipeline Phases I and II	156,000 g.p.d. supply from Lowati River, 46,025 feet of 6"—3" pipe, three 20,000 gallon storage tanks, eleven domestic points and two cattle troughs.	17,664
69	Nanjara Pipeline Phase I	30,000 g.p.d. supply from Nanjara Spring, 20,500 feet of 4"—1½".	3,997
<i>Mbulu District:</i>			
70	Rhotia Pipeline	30,000 g.p.d. supply from Manera River, 43,900 feet of 4"—1½" pipe, five 3,000 gallon storage tanks, with domestic points and five cattle troughs.	4,298

APPENDIX I—*contd.*

**SUMMARY OF WATER SUPPLY WORKS CARRIED OUT
IN 1962**

Location No. Map. I.	Name and Location	General Description	Exp. during year
<i>NORTHERN REGION—contd.</i>			
<i>Masailand District:</i>			
71	Malambo Pipeline Repairs	Restoration of intake, cattle trough and goat trough, relaying part of reticulation.	382
72	Munge Pipeline Repairs	Restoration of intake, break pressure points, cattle troughs, construction of new cattle trough.	47
73	Wasso Springs Pipeline	9,000 g.p.d. stock water supply from Wasso Springs, 2,500 ft. of 1½" pipe one 4,500 gallon storage tank combined with cattle trough.	34
74	Monduli Minor Settlement Water Supply	Major improvements to existing supply to provide 60,000 g.p.d. New intake, settling tank, dosing and mixing tank, three 20,000 gallon storage tanks, resiting of steel storage tank, 7,650 ft. of 2½"—2" pipe.	3,515
75	Lorion Valley Water Supply	30,000 g.p.d. supply from Lobulu Springs to Lorion Valley Quarantine Area, 11,400 ft. of 3", 2½" and 2" pipe, one 20,000 gallon storage tank, two cattle troughs.	4,188
<i>TANGA REGION</i>			
<i>Tanga District:</i>			
76	Nairobi Dam	18,000 cu. yds. earth dam for cattle watering, 26' high, 672' long, capacity 150 acre feet.	3,988
77	Magila Water Supply	40,000 g.p.d. gravity water supply from stream, 11,480 ft. of 2" × 1½" piping, and 20,000 gallon storage tank.	5,276
78	Pongwe Water Supply Extension	Construction of two automatic Water Selling Kiosks.	665
<i>Lushoto District:</i>			
79	Kitivo Irrigation Scheme	7,000 feet of main channel extension together with regulators, road crossings, and cross drainage structures. Capacity of channel 15 cusecs.	5,485
80	Soni Water Supply	20,000 g.p.d. gravity supply from spring for domestic water, 7,100 feet of 3" and 2" pipe, 20,000 gallon storage tank, three water selling kiosks and twenty-four metered connections.	968
81	Mlalo Water Supply	20,000 g.p.h. gravity water supply for domestic water, 8,000 ft. of 2" and 1½" pipe, 20,000 gallon storage tanks, and seven water selling kiosks.	4,600
<i>Same District:</i>			
82	Kamari Water Supply	1,200 g.p.h. pumped supply from borehole to 5,000 gallon tank, cattle trough and domestic point.	338
83	Muwanga Water Supply	1,200 g.p.d. pumped supply from borehole to 5,000 gallon tank, cattle trough and domestic point and including an extension of 300' of 1½" pipe.	1,431
84	Ndea Water Supply	Pumped supply from borehole to 5,000 gallon tank, cattle trough and domestic point.	1,715
85	Kalimawe Irrigation Scheme	6 storm water overcrossings, and 6 miles of storm water drain and bund.	12,965

APPENDIX I—*contd.*

SUMMARY OF WATER SUPPLY WORKS CARRIED OUT
IN 1962

Location No. Map. I.	Name and Location	General Description	Exp. during year
TANGA REGION— <i>contd.</i>			
<i>Handeni District:</i>			
86	Shallow Wells	Three shallow wells constructed.	780
<i>Pangani District:</i>			
87	Pangani Water Supply Phase I	Pumped supply to Minor Settlement from borehole yielding 7,000 g.p.h., 20,000 gallon storage tank, 11,000 feet of 4" pipe. Electric submersible pump installation.	12,761
88	Boza School Water Supply	Pumped supply from borehole to 10,000 gallon storage tank.	1,645
89	Magila Water Supply Extension	Construction of additional kiosks.	595
90	Repairs to Toloha Pipeline	Relaying pipeline and repairing cattle trough as result of damage by elephants.	230
SOUTHERN REGION		NIL.	
SOUTHERN HIGHLANDS REGION			
<i>Mbeya District:</i>			
91	Mbozi Spring Capping	Continuation of work on improvement to springs.	185
92	Mbarali Irrigation Scheme	Road syphon constructed at end of canal SIIa ₂ , and footbridge across main canal. Work by T.A.C.	—
93	Utengule Furrow	Construction of new main channel and repairs to headworks.	5,875
<i>Iringa District:</i>			
94	Kalenga Irrigation Scheme	830 ft. of main channel was culverted and a 2' dia. under syphon installed at Mbuga crossing. Length of syphon 90'.	4,563
<i>Njombe District:</i>			
95	Saja and Ngani Wells	Construction of 4' dia. concrete lined wells.	21
<i>Chunya District:</i>			
96	Kanbikatoto Wells	Construction of 4' dia. concrete lined wells.	16

DRILLING OPERATIONS, 1962

(TDS=Total Dissolved Solids, F=Fluorine, Cl=Chlorine, NO₃=Nitrates, SO₄=Sulphate)

B. H. Number and Location No. Map II	Date Completed	Depth in feet	Yield per hour in gallons	Static Water Level in feet	Dept at which water struck in feet	Chemical Properties in Parts in Million	Total Cost Shs.	Applicant	Locality and Region	Formation	Remarks
2/61 (1)	1.2.62	450	12	420	168	—	11,931	Tanganika Agricultural Corporation	Kitengule Plains, West Lake	Clayey Alluvium, phyllites and shales of Karagwe-Ankolean	Yield insufficient abandoned.
38/61 (2)	17.1.62	232	1,400	107	125, 135 and 206	TDS 1555.0 Cl 666.0 F 0.2 NO ₃ trace	—	Kazamia Sisal Estate	Kunduchi, Eastern	Fine and coarse sands with angular gravel deposits	—
1/62 (3)	20.3.62	168.3	Trickle only	132.6	148.6	—	11,945	Local Authority	Mtita, Dodoma, Central	Partly cemented angular sands and sub-angular gravels (oxidized) on contaminated Granite	Yield insufficient abandoned.
2/62 (4)	31.1.62	191	9,000	75	79.5	TDS 940.0 Cl 216.0 F Nil NO ₃ trace	10,663	Local Authority	Kilumbwi, Tanganyika Dist., Tanga	Coral limestone and sands with angular gravels of Tertiary deposits	—
8/62 (6)	16.3.62	288	60	197	230	—	8,604	Local Authority	Shume, Lushoto Dist., Tanga	Thin mantle of superfcials over sericite schists and biotite-hornblende granite of Usagaran	Yield insufficient abandoned.
4/62 (6)	30.3.62	450	200	112	113	—	14,988	Tanganika Agricultural Corporation	Kitengule Plains, West Lake	Buff-pinkish phyllites and shales of Karagwe-Ankolean	Yield insufficient abandoned.
5/62 (7)	17.4.62	150.6	1,500	1	55	TDS 648 Cl 24.0 F 4.0 NO ₃ Nil	17,248	Kinampanda Lutheran Mission	Kinampanda, Iramba Dist., Central	Terrestrial deposits and ferrirete plus metadolomite on Nyanzian schists.	Hole gravel-screened

DRILLING OPERATIONS, 1962

(TDS=Total Dissolved Solids, F=Fluorine, Cl=Chlorine, NO₃=Nitrates, SO₄=Sulphate)

B. H. Number and Location No. Map II	Date Completed	Depth in feet	Yield per hour in gallons	Static Water Level in feet	Depth at which water struck in feet	Chemical Properties in Parts per Million	Total Cost Shs.	Applicant	Locality and Region	Formation	Remarks
6/62 (8)	11.4.62	205	3,000	18	20	TDS. 1650 Cl. 392.0 F. 0.2 NO ₃ 4.84	11,894	Local Authority	Myonero, Morogoro Dist., Eastern	Clays, Sand and gravel of Quaternary deposits	Hole gravel-screened.
7/62 (9)	7.12.62	400	200	23	30 and 120	TDS. 5442.0 Cl. 718.0 F. 2.0 NO ₃ Nil	17,610	Local Authority	Saga-Saga Morogoro Dist., Eastern	Clay and calcareous shales of Jurassic	Acceptance pending decision on chemical analysis results. Gravel-screened.
8/62 (10)	3.12.62 commenced	354 refilled to 300	300	173	205	Not yet received	—	Local Authority	Mkulazi Morogoro Dist., Eastern	Shales and fine grain size sandstone of Jurassic (lower)	Drilling continue Hole gravel-screened
9/62 (11)	17.11.62	350	320	99.9	122	TDS. 123.0 Cl. 172.0 F. Nil NO ₃ trace	21,393	Local Authority	Gronero, Morogoro Dist., Eastern	Limestone interbedded with fossiliferous sandstone of Jurassic	—
11/62 (12)	19.5.62	300	733	120	170	TDS. 408.0 Cl. 44.0 F. 0.2 NO ₃ trace	15,130	Veterinary Division	Kalema, Kondoa Dist., Central	Quaternary sands and gravels on river flats over Usagaran	Hole gravel-screened.
12/62 (13)	25.5.62	152.6	562	122.6	138	TDS. 1155.0 Cl. 184.0 F. 0.4 NO ₃ 143.0	12,344	Local Authority	Choda, Singida Dist., Central	Mbuza limestone, iron-cemented sands on weathered hornblendes granite, followed by fresh acidic granite.	—
13/62 (14)	8.6.62	60	250	2	2	TDS. 327.0 Cl. 21.0 F. 4.8 NO ₃ trace	6,940	Local Authority	Nyaketo, Mwanza Dist., Lake	Quaternary capped sands in shallow river valley over pinkish granite	Hole gravel-screened and capped awaiting further auguring.

DRILLING OPERATIONS, 1962

(TDS=Total Dissolved Solids, F=Fluorine, Cl=Chlorine, NO₃=Nitrates, SO₄=Sulphate)

B. H. Number and Location No. Map II	Date Completed	Depth in feet	Yield per hour in gallons	Static Water Level in feet	Depth at which water struck in feet	Chemical Properties in Parts per Million	Total Cost Sh.	Applicant	Locality and Region	Formation	Remarks
14/62 (15)	27.6.62	532	2,200 +	151	202 trickle 233 246	TDS. 764.0 Cl. 24.0 F. 0.8 NO ₃ trace	12,167	Local Authority	Bumbata/Chungai, Kondea Dist., Central	Calcareous cemented fine sands and poorly sorted sands with gravel to 230' on weathered Usagaran	—
15/62 (16)	19.7.62	240	2,400	102	117	TDS. 684.0 Cl. 108.0 F. 2.0	9,000	Local Authority	Rhino Hill, Kondea Dist., Central	Munga clays and limestone, calcareous cemented sands to 190' then weathered gneisses of Usagaran	—
16/62 (17)	21.7.62	300	1,320	47	74	TDS. 208.0 Cl. 88.0 F. Nil NO ₃ trace	11,027	Local Authority	Kilimille, Bukoba Dist.,	Raddish phyllites and sandstones of Karagwe-Ankolean	—
17/62 (18)	11.9.62	450	80	244	290	—	9,206	Local Authority	Mabale, Bukoba Dist., West Lake	Clayey alluvium over phyllites of Karagwe-Ankolean	Water insufficient Abandoned.
19/62 (19)	26.7.62	400	1,400	169	238 and 250	Not yet received	20,800	Local Authority	Imaiasoko, Maswa Dist., Lake	Lacustrine clayey calcareous deposits over weathered granite	—
20/62 (20)	28.8.62	150	1,500	39	49	TDS. 907.0 Cl. 88.0 F. 5.0 NO ₃ 13.43	7,440	Bishop of Shinyanga	Sayit-Sayit Mission, Maswa Dist., Lake	Thin blanket of supericials over weathered granite	—
21/62 (21)	—	70	—	23.10	33	—	—	Government	Kidunda, Eastern	Mudstone shales and sandstones of Jurassic	* Exploratory bore holes at
22/62 (22)	—	45	dry	—	—	—	—	Government	Kidunda, Eastern	Sandstone of Jurassic	Kidunda, Eastern
23/62 (23)	—	30	—	—	—	—	—	Government	Kidunda, Eastern	Mudstone and sandstone of Jurassic	Region

* Remarks continue next page for all bore holes in Kidunda, Eastern Region.

DRILLING OPERATIONS, 1962

(TDS = Total Dissolved Solids, F = Fluorine, Cl = Chlorine, NO₃ = Nitrates, SO₄ = Sulphate)

B. H. Number and Location Map II	Date Completed	Depth in feet	Yield per hour in gallons	Static Water Level in feet	Depth at which water struck in feet	Chemical Properties in Parts per Million	Total Cost Shs.	Applicant	Locality and Region	Formation	Remarks
24/62 (24)	—	30	dry	—	—	—	—	Government	Kidunda, Eastern	Mudstone of Jurassic	for proposed Dam
25/62 (25)	—	40	dry	—	—	—	—	Government	Kidunda, Eastern	Sandstone and reddish mudstone of Jurassic	across Ruvu River.
26/62 (26)	—	30	dry	—	—	—	—	Government	Kidunda, Eastern	Mudstone of Jurassic	
27/62 (27)	—	35	dry	—	—	—	—	Government	Kidunda, Eastern	Alluvial deposits thin mudstone of Jurassic	
28/62 (28)	10.9.62	27	—	—	—	—	5,790	Bishop of Shinyanga	Mipa Mission, Lake	Two attempts, each time fresh granite at 27'	Dry abandoned.
29/62 (29)	22.11.62	214	210	10	20	—	16,840	Local Authority	Masawa, Kilimanjaro Dist., Lake	Sandy superficials on weathered granite, over fresh granite	Water brackish, abandoned.
32/62 (30)	8.11.62	103	1,000 +	14	44 and 75	Not yet received	8,587	Local Authority	Inkumba, Iramba Dist., Central	Iron-cemented sands and gravels throughout (only partly pierced) over granite rocks	—
33/62 (31)	14.12.62	200	1,650	101	154	Not yet received	11,429	Local Authority	Tunda, Iramba Dist., Central	Calcareous clays and cemented sands and gravels over weathered and fresh granite	—
34/62 (32)	25.1.63	250	1,500	90	90	Not yet received	—	Local Authority	Zagayib, Masaya, Dist., Lake	Strata samples not yet received	—
35/62 (33)	commenced 17.12.62	67 on 31.12.62	—	—	—	—	—	Local Authority	Singa, Iramba,	Not yet received	Drilling continues.

DETAILS OF SOME SELECTED GAUGING STATIONS

(E)=Estimated without measurement, (RR)=Stations re-rated since last Annual Report,
(M)=Million, (SG)=Staff Gauge, (RG)=Rain Gauge.

Station No.	Type of Gauge	River	Catchment Area Square Miles	Position on River		Date readings started	Recorded flow to Date		Hydro-Years Nov. 1st-Oct. 30th	
				Latitude South	Longitude East		Minimum in Cusecs	Maximum in Cusecs	Mean Annual Acre-Feet	No. Years
EASTERN REGION	S.G. 0-20 ft.	Ward ...	11,000	6° 27'	37° 32'	14,11.53	35.0	10,250	375,303	3
	S.G. 0-25 ft.	Kisumu ...	...	6° 12'	37° 34'	9,8.54	0.13	3,400	32,990	2
	S.G. 0-15 ft.	Mkandoo ...	703	6° 15'	37° 19'	13,11.58	2.0	11,500	—	—
	S.G. 0-15 ft.	Mkundi ...	703	6° 15'	37° 19'	18,7.62	—	(E)	—	—
	S.G. 0-15 ft.	Diwale ...	1,270	6° 10'	37° 37'	27,8.63	8.0	2,450	141,840	7
	Cipolletti Weir 0-1 ft.	Chazi ...	—	6° 12'	37° 34'	9,8.54	0.13	115	3,820	5
	S.G. 0-5 ft.	Mkandoo ...	6,780	6° 48'	36° 59'	13,3.52	45.0	3,400	200,704	7
	S.G. 0-15 ft.	Mkandoo ...	104	6° 31'	36° 50'	13,9.52	18.0	(E)	47,351	8
	S.G. 0-15 ft.	Myombo ...	117	7° 04'	36° 55'	10,7.54	21.0	1,700	74,280	2
	S.G. 0-25 ft. Cableway	Ruvu ...	2,616	7° 16'	38° 15'	26,7.51	46.0	14,000(E)	1,200(M)	9
	S.G. 0-25 ft. Recorder	Ruvu ...	162	7° 01'	37° 48'	8,10.62	52.0	37,500(E)	397,150	8
	S.G. 0-25 ft. Recorder	Ruvu ...	5,601	6° 41'	38° 41'	11,12.58	48.0	20,000(E)	1,08(M)	2
	S.G. 0-20 ft.	Ngerengere ...	1,096	7° 01'	38° 19'	22,8.50	Dry	2,546	91,776	11
	S.G. 0-15 ft. Cableway	Ngerengere ...	270	6° 44'	37° 47'	23,8.50	Dry	1,570	77,344	10
	Cipolletti Weir 0-1.5 ft.	Morogoro ...	9	6° 50'	37° 40'	27,3.54	Trace	776(RR)	13,524	5
	Cipolletti Weir 0-1.5 ft.	Ngerengere ...	8	6° 55'	37° 36'	25,3.54	2.9	2,183(E)	18,128	5
	S.G. 0-10 ft. Compound V-notch.	Ngera ...	6	6° 56'	37° 35'	21,3.54	0.13	495(E)	5,938	5
	River changed course into an old stream bed	Mgeta ...	2	7° 00'	37° 36'	12,8.54	1.86	600(E)	5,138	7
	Cipolletti Weir 0-1.2 ft.	Mwarazi ...	97	7° 12'	37° 50'	11,3.54	32.0	12,000(E)	206,104	5
	S.G. 0-5 ft.	Mvuhia ...	...	...	...	...	...	...	...	...
	S.G. 0-25 ft. Cableway	Rufiji ...	61,108	7° 48'	37° 55'	19,10.54	398	252,000(E)	20,46(M)	6
	Cableway	Rt. Kushi ...	30,905	7° 55'	38° 00'	28,1.55	2,400	36,000	20,46(M)	5
	S.G. 0-15 ft.	Mt. Kushi ...	7,037	8° 55'	38° 43'	10,12.56	435	29,000	5,490(M)	5
	S.G. 0-15 ft.	Mwanga ...	1,950	8° 55'	38° 43'	10,12.56	758	5,800	822,000	3
	Slope Gauge	Muyara ...	3,294	9° 01'	35° 19'	8,12.56	758	14,000	1,53(M)	3
	S.G. 0-20 ft.	Rufiji ...	...	8° 57'	35° 59'	12,12.56	822	15,000	2,53(M)	3

DETAILS OF SOME SELECTED GAUGING STATIONS

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(M)=Million, (SG)=Staff Gauge, (RG)=Rain Gauge.

Station No.	Type of Gauge	River	Catchment Area Square Miles	Position on River		Date readings started	Recorded flow to Date		Hydro-Years Nov. 1st-Oct. 30th	
				Latitude South	Longitude East		Minimum in Cubes	Maximum in Cubes	Mean Annual Acre-Feet	No. Years
SOUTHERN HIGHLANDS REGION 1 KA 14 1 KB 15 1 KB 16 1 KB 17 1 KA 2	S.G. 0-20 ft.	Lumemo	164	8° 08'	38° 40'	1.12.57	70	8,250(E)	211,000	2
	S.G. 0-20 ft.	Mgeta	124	8° 20'	38° 37'	20.11.57	127	—	—	—
	S.G. 0-15 ft.	Furua	507	8° 56'	38° 05'	25.11.57	80.0	8,500	482,000	2
	S.G. 0-25 ft. Recorders,	Kilombero	12,915	8° 12'	37° 00'	27.11.57	2,890	100,000(E)	9.0(M)	2
	Cableway	Little Ruaha	1,127	7° 47'	35° 41'	9.11.54	124	5,200	464,000	5
	Washed out and not for publication	Gt. Ruaha	—	—	—	—	—	—	—	—
	S.G. 0-15 ft.	—	—	—	—	—	—	—	—	—
	Recorder R.G. not for publication	—	—	—	—	—	—	—	—	—
	S.G. 0-5 ft.	Kimanu	173	8° 50'	34° 10'	1.11.54	13.0	8,400	185,000	5
	S.G. 0-10 ft.	Mtutu	172	8° 02'	35° 43'	10.9.56	40.0	900	84,500	2
	S.G. 0-10 ft.	Little Ruaha	2,005	7° 02'	35° 30'	1.11.56	79.0	5,800	473,000	3
	S.G. 0-15 ft.	Kisigo	9,540	6° 57'	35° 35'	15.11.57	Dry	9,500	276,000	2
TANGANYIKA REGION 1 RC 1 1 RC 2 1 RC 3 2 A 6 3 A 7 3 A 8 3 A 12 3 B 10 3 B 11 3 B 12	S.G. 0-20 ft.	Lunro	641	9° 33'	33° 52'	28.5.54	286	20,400	1,222(M)	4
	S.G. 0-28.7 ft. Slope	Mwala	253	9° 10'	33° 33'	6.4.57	232	10,800(E)	361,900	2
	S.G. 0-10 ft.	Kwira	187.5	8° 59'	33° 13'	12.10.55	1.2	2,650(E)	105,275	4
	S.G. 0-10 ft.	Songwe	44.5	8° 56'	33° 53'	30.9.55	15.0	200	28,967	4
	S.G. 0-5 ft.	Nzovwe	18.7	8° 56'	33° 53'	30.9.55	0.25	446	14,380	3
	S.G. 0-5 ft.	Ruanda	58.2	8° 59'	33° 04'	30.9.55	5.8	650(E)	51,876	3
	S.G. 0-10 ft.	Myovisi	6.30	8° 53'	33° 29'	1.9.56	0.43	45	3,403	3
	S.G. 0-3 ft.	Stimba	6.30	9° 09'	32° 53'	1.9.56	Trace	22(R.R.)	—	—
	Wair 0-2 ft.	Haraka	2.9	9° 09'	32° 53'	23.2.57	Dry	15,000(E)	—	—
	S.G. 5-10 ft.	Lulika	—	8° 24'	32° 55'	—	—	—	—	—
	S.G. 0-10 ft.	Umba	74	4° 31' 50"	38° 22' 16"	13.7.52	2.00	271	—	—
	S.G. 0-10 ft.	Sigi	250	5° 00' 55"	38° 23' 40"	1.5.53	5.03	3,130(E)	598,000	1
TANGANYIKA REGION 1 C 1 1 C 2 1 D 1 1 D 2 1 D 3 1 D 4 1 D 5 1 D 6 1 D 7 1 D 8 1 D 9 1 D 10 1 D 11 1 D 12	S.G. 0-15 ft.	Pangani	9,650	4° 58'	38° 05'	10.7.51	398	3,600	406,000	6
	S.G. 0-10 ft.	Pangani	7,265	4° 58'	38° 05'	12.3.52	387	1,080	—	—
	S.G. 0-10 ft.	Pangani	6,800	5° 19' 40"	38° 19' 15"	13.2.59	Dry	1,530(E)	995,000	2
	S.G. 0-5 ft.	Pangani	6,800	4° 39'	38° 02'	15.4.58	483	1,940	890,000	2
	S.G. 0-10 ft.	Pangani	10,600	5° 17' 45"	38° 38' 15"	7.5.58	386	9,970(E)	584,000	2
	S.G. 0-10 ft.	Pangani	5,860	4° 36'	37° 43'	14.2.59	328	2,240	—	—
	S.G. 0-10 ft.	Pangani	—	—	—	—	—	—	—	—
	S.G. 0-10 ft.	Pangani	—	—	—	—	—	—	—	—
	S.G. 0-10 ft.	Pangani	—	—	—	—	—	—	—	—
	S.G. 0-10 ft.	Pangani	—	—	—	—	—	—	—	—
	S.G. 0-10 ft.	Pangani	—	—	—	—	—	—	—	—
	S.G. 0-10 ft.	Pangani	—	—	—	—	—	—	—	—

DETAILS OF SOME SELECTED GAUGING STATIONS

(E)=Estimated without measurement, (RR)=Stations re-rated since last Annual Report,

(M)=Million, (SG)=Staff Gauge, (RG)=Rain Gauge.

Station No.	Type of Gauge	River	Catchment Area Square Miles	Position on River		Date readings started	Recorded flow to Date		Hydro-Years Nov. 1st-Oct. 30th
				Latitude South	Longitude East		Minimum in Cusecs	Maximum in Cusecs	
TANGA REGION— <i>contd.</i>									
1 D 14	S.G. 0-10 ft.	Pangani	9,800	5° 10' 08"	38° 28' 05"	23.4.59	375(E)	6,000(E)	2
1 D 15	S.G. 0-10 ft.	Pangani	9,212	5° 03' 45"	38° 07' 30"	3.11.59	435	2,600	2
1 DB 6	S.G. 0-10 ft.	Mumbo	180	4° 53' 20"	38° 15' 17"	15.1.53	3.32	520(E)	1
NORTHERN REGION									
1 D 8	S.G. 0-10 ft.	Pangani	2,900	3° 48'	37° 28'	17.57	498	7,000(E)	3
1 DC 1	S.G. 0-10 ft.	Ruvu	1,000	3° 33'	37° 29'	19.8.52	200	1,350	3
1 DC 2A	S.G. 0-10 ft.	Ruvu	570(E)	3° 31' 40"	37° 33' 50"	27.11.59	80.0	610(E)	3
1 DC 3A	S.G. 0-5 ft.	Mao	150(E)	3° 30'	37° 27'	23.9.60	1.80	350	—
1 DC 6	S.G. 0-10 ft.	Mao	94	3° 29'	37° 28'	17.8.52	111	796(E)	4
1 DC 7	S.G. 0-10 ft.	Mao	93	3° 29'	37° 31'	28.1.53	Dry	350(E)	4
1 DC 11	S.G. 0-5 ft.	Himo	63	3° 33'	37° 33'	30.9.59	Dry	2,870(E)	3
1 DC 13	S.G. 0-5 ft.	Nfiro tafu	—	3° 25'	37° 38'	25.3.52	5.0	51(E)	3
1 DC 15A	S.G. 0-5 ft.	Taveta canal	—	3° 41'	37° 48'	1.5.52	Dry	92(E)	—
1 DD 1	S.G. 0-15 ft. and recorder	Kikuletwa	1,123	3° 31' 30"	37° 25' 20"	12.11.57	11.71	11,000(E)	6
1 DD 2	S.G. 0-15 ft. and recorder	Kikuletwa	980	3° 30'	37° 17'	3.3.52	536	2,400(E)	5
1 DD 3	S.G. 5-20 ft.	Karanga	78	3° 18'	37° 18'	1.2.53	—	2,400(E)	5
1 DD 5A	S.G. 0-5 ft.	Weruweru	61	3° 20'	37° 10'	—	—	2,400(E)	6
1 DD 7	S.G. 10-15 ft.	Nere	21	3° 19'	37° 15'	11.1.53	Dry	721(E)	3
1 DD 8	S.G. 10-15 ft.	Kikafu	53	3° 19'	37° 13'	1.12.52	2.0	643(E)	2
1 DD 9	S.G. 10-20 ft.	Kware	95	3° 20'	37° 13'	1.12.52	Dry	1,600(E)	5
1 DD 10	S.G. 0-10 ft.	Kware	16	3° 17'	37° 10'	11.11.52	Dry	561(E)	5
1 DD 38	S.G. 0-5 ft.	Geraragua	11	3° 04'	37° 09'	24.2.53	0.24	688(E)	6
2 C 7	S.G. 0-5 ft.	Ngare Nairobi S.	15	3° 02'	37° 04'	8.4.53	Dry	1,150(E)	6
2 C 7	S.G. 10-20 ft.	Ngare Nairobi S.	15	3° 02'	37° 03'	25.2.54	Trace	920(E)	2
CENTRAL REGION									
2 DD 16	S.G. 0-15 ft.	Kinyasungwe	4,140	6° 12'	36° 17'	26.2.58	Dry	2,180(E)	—
2 R 1A	S.G. 0-20 ft.	Bubu	2,694	5° 18' 50"	35° 35'	Nov. 59	—	497	—
2 R 4	S.G. 0-10 ft.	Bubu	3,989	5° 57'	35° 18'	25.9.59	Dry	1,330	—
2 R 5	S.G. 0-10 ft.	Bubu	1,084	4° 49' 10"	35° 42' 07"	3.3.56	Dry	784	—
2 R 7	S.G. 0-15 ft.	Bubu	1,613	5° 12' 35"	35° 44' 50"	1.12.56	Dry	871	—
2 R 8	S.G. 0-10 ft.	Bubu	393	5° 01' 06"	35° 40'	13.11.59	Dry	912	—
2 R 15A	Four Section Reach	Mkondoa	90	4° 54' 06"	35° 46'	1.12.59	Dry	14,800(E)	—

APPENDIX IV

DEPARTMENTAL TRANSPORT, PLANT AND EARTH-MOVING EQUIPMENT, 1962

1.	Petrol Vehicles	...	...	Bedford Pick-up	...	...	...	...	8
				Bedford 30 cwt.	...	...	...	...	7
				Bedford 2 ton.	...	...	...	...	6
				Bedford 3 ton.	...	...	...	...	8
				Bedford 5 ton.	...	...	...	...	38
				Bedford 5 ton. Tipper	...	...	...	...	21
				Bedford 5 ton Tipper L.W.B.	...	...	...	...	25
				Bedford Scammell with 8 ton Pipe Trailer	...	...	...	...	8
				Bedford 7 ton	...	...	...	...	2
				Ford Workshop	...	...	...	...	1
				Dodge Workshop	...	...	...	...	1
				Land Rover S.W.B.	...	...	...	...	23
				Land Rover L.W.B.	...	...	...	...	60
				Motor Cycle, B.S.A. 500 c.c.	...	...	...	...	1
2.	Diesel Vehicles	...	...	Thornycroft "Nubian" 5 ton	...	...	...	...	10
				Scammell Medium Duty Tractor	...	...	...	...	1
				Bedford 2 ton	...	...	...	...	10
				Leyland Comet 4×4	...	...	...	...	44
3.	Caravans	...	...	All Types	...	...	...	...	3
4.	Trailers	...	...	Low Loader 24 ton	...	...	...	...	1
				Low Loader 18 ton	...	...	...	...	1
				Low Loader 15 ton	...	...	...	...	1
				Low Loader 8 ton	...	...	...	...	6
				Water Tank 200 gallons	...	...	...	...	15
				Water Tank 800 gallons	...	...	...	...	14
				Fuel Oil Tanker 450 gallons	...	...	...	...	1
				Fuel Oil Tanker 1,500 gallons...	...	...	...	...	3
				Land Rover Trailers	...	...	...	...	18
				Load Carrying 4 ton	...	...	...	...	1
				Load Carrying 5 ton	...	...	...	...	2
5.	Drilling Rigs	...	...	Load Carrying 6 ton	...	...	...	...	3
				Pipe Trailer	...	...	...	...	1
				Ruston Bucyrus 22 W	...	...	...	...	9
				Banka Drill	...	...	...	...	13
				Diamond Drill Craelius	...	...	...	...	1
6.	Tractors, Wheeled	...	...	Lightweight Soil Testing Rig	...	...	...	...	1
				Fordson Major	...	...	...	...	1
				Tournapull Model "D" Roadster	...	...	...	...	9
				Caterpillar D.W. 15	...	...	...	...	3
7.	Tractors, Tracked	...	...	Fordson Manual Roadless 4×4	...	...	...	...	1
				Caterpillar D. 2...	...	...	...	...	4
				Caterpillar D. 4	...	...	...	...	21
				Caterpillar D. 7	...	...	...	...	9
				Caterpillar D. 8	...	...	...	...	1
8.	Scrapers	...	...	International T.D. 18	...	...	...	...	1
				La-Plante Choate 4 cubic yards	...	...	...	...	3
				Le-Tourneau 4 cubic yards	...	...	...	...	4
				Landsborough/Findlay 4 cubic yards	...	...	...	...	1
				Killefer Botary	...	...	...	...	4
				Le-Tourneau, 8/11 cubic yards	...	...	...	...	5
				Bartles 4 cubic yards	...	...	...	...	3
				Caterpillar Type No. 40, 4 cu. yds.	...	...	...	...	11
				Caterpillar No. 428, 13 cu. yds.	...	...	...	...	3
				Caterpillar No. 435, 13 cu. yds.	...	...	...	...	4
				Onions 4/6	...	...	...	...	2

DEPARTMENTAL TRANSPORT, PLANT AND EARTH-MOVING EQUIPMENT, 1962

9.	Rippers	Killefer	1
		Onions	2
		Blan Knox	1
		Le-Tourneau	2
		Bartles Series 20 S.H.	3
		Caterpillar No. 4	3
		Ateco, Hydraulic Rear Mounted	3
10.	Traxcavator	Traxcavator No. 955	1
11.	Compressors	Holman 68 C.F.M.	7
		Holman 150 C.F.M.	4
		Holman 215 C.F.M.	3
		Fordson Tractor	1
12.	Rock Drills	Warsop	2
		Atlas Copco	5
13.	Concrete Mixers	Godwin 7/5	9
		Godwin 10/7	1
		Parker 5/3½	5
		Parker 7/5	1
		Parker 10/7	2
		Winget 5/3½	2
		Winget 7/5	15
		Millar 10/7	1
		Bedford 10/7	1
14.	Portable Pumps	Winget	4
		Pegson 3"	12
		Sykes	1
		Dando Diaphragm	9
		Pegson Diaphragm 4"	6
15.	Stone Crushers	Baxter	1
		Pegson	5
16.	Mobile Welding Sets	Quasi-Arc	4
17.	Excavators	Ruston-Bucyrus 10 R.B.	2
18.	Dumpers... ..	Muirhill 5 cubic yards	3
19.	Tile Machine	Pegson	1
	Block Machine	Various	17
20.	Vibrating Pokers	Winget	6
21.	Power Mast	Locally Built	1
22.	Terracers	Preco	7
23.	Fire Pump	Coventry Climax Trailer	1
24.	Lighting Set	Brush Petter 1; 25 K.W.	1
25.	Motor Boat	B.B.S.	1
26.	Mobile Charging Plant	Alco	1

APPENDIX V

SUMMARY OF COMPLETED WATER DEVELOPMENT WORKS, 1962

Item	Description	Completed during 1962
1.	Earth dams, hafirs and charcos	No. 9
2.	Total storage capacity of item 1.	Acre-feet 1,011
3.*	Gravity pipelines and pumped supplies	No. 21
4.*	Total delivery from item 3	Gallons/Day $\times$ 1,000 1,070
5.	Boreholes successfully drilled	No. 17
6.	Total footage of item 5	Feet 3,654
7.	Total test yield of item 5	Gallons/Hour $\times$ 1,000 29

*Includes 223,000 g.p.d. supply to Mbarika Pilot Irrigation Scheme.



REPUBLIC OF TANGANYIKA

MINISTRY OF AGRICULTURE

Annual Report
of the
Veterinary Division
1962

1964
PRINTED BY THE GOVERNMENT PRINTER
DAR ES SALAAM

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ANNUAL REPORT OF THE VETERINARY DIVISION, FOR THE YEAR ENDING 1962

INTRODUCTION

Following the re-organization, on 1st July, 1962, of the Ministry of Agriculture into seven Divisions, the Veterinary Division relinquished many of the responsibilities it had borne in the past. Animal Husbandry, the distribution of improved livestock, livestock breeding research, livestock marketing and industry, including dairying and hides and skins, poultry husbandry and associated activities were taken under the wing of other Divisions within the Ministry, leaving the Division with the following reduced schedule:—

- (a) veterinary services;
- (b) animal disease control;
- (c) animal disease research;
- (d) control of stock routes;
- (e) meat hygiene and inspection.

From the above may be deduced the reason for the comparative brevity and narrowed scope of the Report which follows.

Dar es Salaam

T. S. LWEBANDIZA,
Director, Veterinary Division,
Ministry of Agriculture

SUMMARY

- (i) Despite a grave shortage of senior staff general animal health was maintained and no major epizootics were encountered.
- (ii) Public interest in the prevention of controllable disease was maintained and in certain sectors, especially that of tick-borne disease control, enhanced.
- (iii) Paucity of funds prevented any major development of the stock-route and Quarantine Stations network, but maintenance and minor improvements were carried out where necessary and feasible.
- (iv) Livestock marketing underwent a period of change, with sales on established livestock markets in the Lake and Central Regions declining, private and co-operative sales taking up the slack.
- (v) Meat inspection and attention to meat hygiene continued as before but there were welcome signs of increased interest in this public health activity by Local Authorities.
- (vi) Routine diagnosis and investigations took up most of the time of the staffs of the Central Veterinary Laboratory and the Veterinary Investigation Centres, interesting information being gained from a sheep/helminth trial and a survey of antibodies in game carried out in conjunction with E.A.V.R.O.

ANIMAL DISEASE

DISEASE CONTROL.

The acute shortage of senior and professional staff mentioned in my opening remarks under this section of our Annual Report for 1961 was exacerbated by further departures of expatriate Veterinary Officers and senior Field Officers during 1962. Furthermore, the fragmentation of the Ministry of Agriculture into seven separate Divisions resulted in the transfer of many of our most experienced and valuable African sub-professional officers to other Divisions often as chief Ministerial representatives in Regional or Area (District) headquarters. Gratifying though it was to receive such acknowledgment of the merit of officers trained in our Division, such redeployment could not but reduce our coverage and efficiency.

We were extremely fortunate that there were no major outbreaks of epizootic disease. Rinderpest, although proven present in game in the Northern Region, was only suspected once in domestic stock and its existence never confirmed. Contagious bovine pleuropneumonia was contained within the Masailand quarantine adjacent to the Kenya frontier. Although rabies was troublesome in our Central, Southern Highlands and Western Regions no extension of the existing infected areas occurred, nor did we suffer the expected invasion from our unsettled neighbours in the west. Foot and Mouth Disease occurred sporadically throughout the country, the majority of outbreaks being Type "O", seven Type "A" and one, at the end of the year, Type SAT. 2. Trypanosomiasis, tick-borne disease, anthrax and blackquarter took their usual toll. Despite all the difficulties and obstacles we held our own in our struggle for the health of the national herd, and in certain sectors were able to claim minor advances.

AFRICAN HORSE SICKNESS.

No incidence. The majority of the small horse population of approximately 200 was protected by annual prophylactic vaccination.

ANTHRAX.

The disease continued to occur sporadically throughout the country, only Iringa, Rungwe and Chunya Districts of the Southern Highlands and Ufipa and Mpanda Districts of the Western Region reporting nil incidence. Cattle, sheep, goats and a dog were affected and there were several reports of illness and deaths in humans as a result of consuming anthrax infected flesh. Voluntary vaccination was at all times available on request but the popularity of this service depended largely upon whether it was provided free by local Authorities or upon payment to local Authorities or central Government. All tradestock emanating from high incidence areas were compulsorily vaccinated before dispatch to prevent spread and possible human infection. Tanganyika Packers Ltd., as a matter of policy, vaccinated all stock purchased on markets and destined for their Arusha and Dar es Salaam factories. Recorded vaccinations for all types of stock, cattle, sheep, goats and including tradestock, Region by Region were:—

Northern	...	...	17,075	Tanga	...	...	6,481
Lake	...	...	60,673	Eastern	...	...	16,949
Western	...	...	51,147	West Lake	...	...	1,088
Central	...	...	52,000				

Total: 205,503.

BLACKQUARTER.

As with Anthrax, Blackquarter occurred sporadically throughout the country and was enzootic in certain areas of the Lake, Northern and Western Regions. In many districts vaccination against Blackquarter was provided free by the local Authorities and full advantage was taken of the service. Recorded vaccinations for all types of stock, cattle, sheep, goats and including tradestock, Region by Region, were:—

Northern	...	...	28,897	Tanga	...	...	4,400
Lake	...	...	187,545	Eastern	...	...	14,383
Western	...	...	26,582	Central	...	...	32,000

Total: 293,807.

BRUCELLOSIS.

Although the disease was known to exist, the incidence and distribution of bovine contagious abortion within Tanganyika had never been the subject of all investigation until early in 1962 when Dr. E. A. Mahlau, an F.A.O. veterinarian on assignment to this country, instituted a survey in the Lake Region. Based on the Mwanza Veterinary Investigation Centre and assisted by the Veterinary Research Officer and staff attached to that Centre, Dr. Mahlau employed the milk ring test on bulk milk samples drawn from all districts of the Region and serum agglutination tests on cattle slaughtered at the Mwanza abattoir as the material for his investigation. Results demonstrated that *B. abortus* infection occurred throughout the Lake Region although incidence varied from 28.3 per cent of all herds tested in the Musoma District to 1.6 per cent in the Kwimba District. Of the sera obtained from the Mwanza abattoir, 15 per cent of the total were positive.

Having clarified the position in the Lake Region, Dr. Mahlau moved to the Northern Region Veterinary Investigation Centre at Arusha to set up a similar survey.

Clinical cases of contagious abortion were also reported from Bukoba and Karagwe in the West Lake Region and from the Tabora District.

CANINE DISTEMPER.

Normal incidence was reported, mainly from the larger urban areas. Prophylactic vaccinations, being expensive, did not attract high demand.

COCCIDIOSIS.

The disease was common in the Arusha District, occurring mainly in calves, and was also reported to a lesser extent elsewhere in the country. Standard treatment with "Zoaquin" or sulphamezathine usually met with success.

CONTAGIOUS BOVINE PLEURO-PNEUMONIA.

There was little change in the overall situation which remained much as it had been at the end of 1961. The disease was contained within the quarantine in the north of the Loliondo Division of Masailand and all known infected herds, totalling 3,161 head, were confined to the Lorien Valley Hospital Quarantine some twenty miles south of the Kenya border and seven miles from Loliondo Minor Settlement. By the generosity of the Director of Veterinary Services, Kenya, a mobile laboratory under the charge of Mr. J. E. Huddart visited the Lorien Valley Quarantine and applied the complement-fixation test to all stock contained therein. Results indicated that only 0.5 per cent were affected and, to relieve pressure within the quarantine, all apparently clean herds were released from Lorien but still confined to the main quarantine. Three outbreaks in herds outside the Lorien Valley were diagnosed during the year, all of them within a few miles of the Kenya border. Such affected herds were moved immediately within the Lorien Valley. It was regrettable that shortage of staff and finance did not permit any further "Operations Dunkirk" (i.e. the marketing and movement of stock under escort from the quarantine to immediate slaughter on arrival at Tanganyika Packers Factory, Arusha).

CONTAGIOUS PUSTULAR DERMATITIS.

A single extensive outbreak occurred at Naipili Chini in the Kilimanjaro District involving 230 sheep and goats. Only young lambs and kids were affected and mortality was low.

DEFICIENCY DISEASES.

Mineral deficiencies were known to exist in many parts of the country especially in the coastal and highland areas and were overcome empirically by the more progressive farmers by the provision of mineral supplements, proprietary or home-made. It was unfortunate that the Bukoba mineral feeding trials were interrupted by lack of enthusiasm on the part of local stock owners, but the Njombe mineral/helminth project (which is reported upon in detail under Research) continued satisfactorily and yielded significant results.

FOOT AND MOUTH DISEASE.

Numerous outbreaks occurred in widely scattered areas throughout the country. Wherever possible specimens were dispatched to the Foot and Mouth Disease World Reference Laboratory, Pirbright, for typing. Of 42 specimens submitted 10 were Type "A", 14 Type "O", 1 Type "SAT. II". The remainder were negative. All outbreaks were mild, with low morbidity and mortality, young calves providing the major number of casualties. There was, however, considerable disruption of the livestock markets, especially in the Northern Region where valuable, high-producing Grade dairy stock had to be protected from infection carried by the passage of tradestock from Mbulu and Masailand en route to the consuming areas of Arusha, Moshi and Korogwe. The origin of the single outbreak of

SAT II in the Ufipa District at the end of the year was obscure, there being no known SAT II outbreaks elsewhere in Tanganyika or in neighbouring Northern Rhodesia. Control measures were limited to voluntary vaccination against Types "O" and "A" in high producing stock, quarantine and the closure of markets in infected areas.

HAEMORRHAGIC SEPTICAEMIA.

Outbreaks were reported from the Northern, Lake, Western, Tanga and Eastern Regions but were limited in extent and effectively controlled by vaccination. A total of 16,782 protective vaccinations were provided on payment during the year.

HELMINTHIASIS.

The group of conditions included under this heading was probably the cause, direct and indirect, of economic loss greater than any other single disease. Apart from deaths in young stock which could be directly attributed, for example, to infestation with *Haemonchus contortus* and *Oesophagostomum* spp., incalculable indirect loss was due to lowered vitality and reduced resistance to superimposed disease, lowered fertility and retarded growth. All Regions reported considerable interest in the use of anthelmintics on the part of stock owners and sales of such remedies increased, but the effect of anthelmintic treatment was frequently nullified by the rapid reinfestation inevitable under conditions of communal grazings and watering points which pertained over the major part of the country. Helminth surveys carried out by the Veterinary Investigation Centres and post-mortem in the field and at abattoirs indicated that *Trichostrongylus* spp., *Oesophagostomum* spp., *Haemonchus contortus* and *Fasciola gigantica* were most commonly incriminated as cause of death or loss of condition amongst domestic stock, whilst amongst the large pet population ancylostomiasis and taeniasis took pride of place.

JOHNE'S DISEASE—PARATUBERCULOSIS.

This disease assumed greater importance during the year for its increased incidence at the Livestock Research Station, Mpwapwa, and at the Marangu Local Authority Stock Farm threatened to interfere with the programme of distribution of improved Indo-African breeding stock. Two cases were diagnosed at Seatondale Farm near Iringa, sub-station of Mpwapwa, both in animals which originated from Mpwapwa, and a further three cases were found in the dairy-herds at Dar es Salaam.

MALIGNANT CATARRH.

No outbreaks were reported during the year. The joint E.A.V.R.O./V.I.C., Arusha investigation into the transmission of the Malignant Catarrh virus from wildebeest to domestic cattle in the Ngorongoro Conservation Area is described under the "Research" section of this Report.

MANGE.

All varieties of mange were encountered throughout the stock-raising areas, sarcoptic being the most widespread. Incidence was noticeably lower in Districts such as Mbulu and Kahama where dipping or spraying was commonly practised. Demodectic mange was also prevalent in goats and domestic dogs and one outbreak of psoroptic mange in sheep ("Sheep Scab") in the Dodoma District, quickly responded to a course of dipping in a B.H.C. compound. Whilst having little obvious adverse effect upon health, mange was the cause of considerable loss of bodily condition and resulted in the down-grading or rejection of large numbers of hides and skins with consequent economic loss.

MASITIS.

Streptococcal mastitis was recorded as commonly occurring in the commercial dairy herds in and around the major townships, but was of little significance in low producing indigenous herds. Curative treatment with antibiotics usually met with success.

POISONING.

Numerous cases were reported in all species of animal, causal agents including hydrocyanic acid ("Star Grass Poisoning") insecticides, fungicides, arsenic and poisonous plants.

POULTRY DISEASES.

Although Fowl Typhoid and Fowl Pox were extremely common and widespread, demand for protective vaccination was limited to the more progressive poultry keepers. Curative treatment for Fowl Typhoid using nitrofurans increased in popularity, distribution being by sale from District Veterinary Offices and Veterinary Centres. There were

several outbreaks of Newcastle Disease at such widely scattered points as Mwanza, Arusha, Same, Tabora and Dar es Salaam. Prophylactic vaccinations in and around infected areas amounted to 7,038, using Kabete Newcastle Disease vaccine.

Other diseases of poultry recorded were Coccidiosis, Infectious Coryza, Aspergillosis, Avian Tuberculosis, Visceral Lymphomatosis and various forms of helminthiasis of which Ascariidiosis appeared the most common.

RABIES.

Rabies remained confined to the extreme westerly Districts of Buha, to the Ufipa District of the Western Region and to the Southern Highlands Region, with a minor extension across the Ruaha River to the southern parts of the Central Region. Control measures employed were the systematic extermination of stray dogs by regular shooting campaigns, voluntary vaccination of dogs on payment and the compulsory free vaccination of dogs (or destruction) of all dogs within 10 miles of any confirmed outbreak. The limited success achieved by these measures could be attributed to poor communications, lukewarm public enthusiasm for the measures and to the high vermin population in the areas involved.

Of 63 brains submitted for examination 19 were shown positive histologically, 8 biologically (intracerebral inoculation of white mice) positive and 36 were negative.

Inoculations and destructions (other than private vaccinations at owner's request) were:—

			<i>Inoculations</i>		<i>Destructions</i>
Southern Highlands Region	...	...	7,342	...	4,756
Western Region	...	...	2,531	...	1,275
Central Region	...	...	1,605	...	223
			11,478	...	6,254

While only 12 human deaths resulted from attacks by rabid dogs or jackal, well over 300 underwent protective treatment after bites.

RIFT VALLEY FEVER.

A severe outbreak at the T.A.C. Ranch at Kongwa caused the death of 170 calves before being brought under control by the administration of immune serum to all newborn calves. The immune serum was prepared at the site of the outbreak by the Chief Veterinary Research Officer and Dr. G. Smith of F.A.O.

In the Ngare Nairobi area of Kilimanjaro District, 1,200 head were vaccinated against Rift Valley Fever as a safety measure.

RINDERPEST.

Although rinderpest was known to be present in a latent form in game in the Ngorongoro Conservation Area (see Rinderpest in "Research" section) and although it was deemed advisable to treat as rinderpest a clinically and epizootologically suspicious outbreak of disease in cattle in the Himo (Moshi) area, there was in fact no confirmed rinderpest in domestic stock during the year. Nor was there any overt rinderpest reported in game. This happy state of affairs was almost entirely due to the arduous and painstaking vaccination campaigns of 1960 and 1961 during which over 1,800,000 susceptibles were protected with K.A.G. virus or lapinized vaccine. Our annual vaccination campaign to form a "cordon sanitaire" protecting our southern and western regions and neighbouring countries to the south took place as before in the Northern, Lake, Western, Central and Tanga Regions. Vaccinations, Region by Region, were as under:—

	<i>Region</i>	<i>K.A.G.</i>	<i>Lapinized</i>
Northern	...	205,914	...
Lake	...	484,249	...
Central	...	93,000	...
Western	...	21,883	...
Tanga	...	11,118	...
Total:	...	816,164	6,707

There were no cases of serious indiscipline during the year.

A management committee was inaugurated to settle common problems with the Research Centre.

5. DEVELOPMENT.

1962 was a year of major development at Ukiriguru. The following extra accommodation was built either by the opening of new buildings completed during the year, or by reconstruction or alteration of existing buildings:—

A new 40-seat classroom.

A 100-seat projection room for Epivisor and Cinema Projector.

A 40-seat laboratory.

A 100-seat new dining hall.

A staff room for staff and entertainment of visitors.

A library.

A reading room for newspapers and magazines.

A visual aids room.

New offices for Principal, Bursar and Clerical Assistants.

The road system at the Institute was re-designed and landscape gardening arranged in front of the new main building. The central campus area was provided with a new main drain and was enclosed by fences and live hedges. A duck pond was built and a crop museum was run as a student project.

Agricultural Development.

Ukiriguru now has an area of Sukumaland where practice can be gained by the students in extension methods including agricultural credit, ox-training, cotton demonstration and a manuring service.

The crop year was unusually wet and the cotton and groundnuts did not yield as highly as usual. On the other hand, cowpeas, paddy, and sweet potatoes yielded abundantly and a good crop of maize for silage was also gathered. Millet proved a failure because of bird damage and it was decided not to continue planting in future.

A great deal of thought was devoted to the future planning of the farms. These were renamed "Mlimani Farm" and "Bondeni Farm" respectively, although the original policy whereby the former concentrated on the production of meat animals, work oxen and cash crops and the latter concentrated on the production of milk, cattle food and cash crops was continued unchanged.

Two small areas (0.33 acres) were used to grow vegetables and the small citrus orchard was also maintained by students. 3,176 lbs. of vegetables were sold during the year for a gross return of Shs. 952/80. The main crops produced were tomatoes, cabbage, spinach, beans and onions.

The policy as regards poultry keeping was changed during the year from the previous system whereby there was one breed of poultry kept under one system of management, to a number of breeds kept under different systems. A number of fold units were constructed from local materials and one student constructed a deep-litter house as his project. Other birds were kept on open range in the vicinity of the Institute main buildings.

UBUNGO TRAINING INSTITUTE

1 STAFF AND GENERAL.

A one-year course for 17 students ended in June and they were posted to various Regions to continue their field training in the Water Development and Irrigation Division. A further course began in October and will continue till August, 1963.

2. TYPES OF INSTRUCTION.

Training is given in:—

- Surveying and levelling including tacheometry.
- Engineering, drawing and quantities.
- Building construction and materials.
- Hydrology.
- Hydraulics.
- Irrigation.

The students go to the Technical College Dar es Salaam for classes in English, mathematics and general physics.

3. INTAKE.

The Ubungo Training Institute is equipped for 20 students and the educational qualification for admission is Standard XII. This year, however, there was a dearth of students and it was possible to recruit only eight. Of these only one has passed the G.C.E., the others have either passed Standard X, or the Ministerial Entrance Examination.

4. THE LIFE OF THE INSTITUTION.

There is little that can be done for such a small body of students, but facilities are available for football, tennis and table-tennis, darts and radio. Students also attend lectures, film shows and study tours to important construction works.

LAND PLANNING TRAINING CENTRE, MOROGORO

1. STAFF AND GENERAL.

There were few staff changes during the year and morale and discipline remained very good. New buildings were erected and facilities increased to accommodate 60 students. Five courses were run for staff of the Development and Extension Divisions. Close liaison was maintained with the Development Division regarding survey training and equipment, and the drawing of plans and maps.

2. COURSES AND INTAKE.

Training Courses. Two members of staff attended a two-week course on teaching techniques at the Technical Institute, Dar es Salaam, during April and May, 1962.

Survey Courses. Seven trainees completed their course and passed the examination in June. They were subsequently promoted to Assistant Field Officer, Grade III in the Development Division.

Fifteen Field Assistants attended a second survey course starting in April and eventually took their examination in January, 1963. Thirteen passed the examination.

Two trainees completed their course in the drawing office and passed their examination in October. They have now been promoted to Assistant Field Officer, Grade III.

Promotion Course. Eleven Assistant Field Officers, Grade II of the Extension Division attended a four-week promotional course during June and July. They were given instruction in simple surveying and Soil Conservation prior to assessment for promotion to Assistant Field Officer, Grade I.

Farm Planning Course. Thirty-two Assistant Field Officers, Grade III and eight Field Assistants, Grade I of the Extension Division attended a farm planning course for four months from August to December.

Owing to the re-organization of the centre and the new building programme, it was possible to hold only one Farm Planning Course.

3. THE LIFE OF THE INSTITUTION.

As a training exercise, the centre played a big part in the layout of the Sonjo settlement scheme. Duty excursions were paid to places of agricultural interest. The centre played its part in nation-building schemes.

4. DEVELOPMENT.

The new building programme was completed towards the end of the year and this included construction of one new dormitory and ablution block to house 20 students; a new block consisting of one classroom to hold 30 students, a lecture room which can hold up to 60 students and a library; a new drawing office and a new store for survey equipment were also completed. The old drawing office and store was converted to a dining-hall and kitchen. Three new staff houses were constructed, one an E-type house for Senior staff and two B II quarters for Junior staff.

The students worked very hard during the year improving the general layout of the Centre and grounds. Bench terraces were constructed, mostly by students, round the new buildings and some of the original dormitories. A football ground was laid out below the new classrooms block and proved a valuable source of recreation.

Trial management holdings. A considerable amount of re-organization and planning of the trial holdings took place during the year.

It was found that it was impractical, as the amount of work involved was too great, to manage three separate holdings representing three different types of farming system. Consequently, one mixed farm of approximately 40 acres was partly developed and planned. Most of the access roads, waterways and conservation works were constructed and the cropping programme is well under way. Several fences were put in and some good pasture established. The trial holding is now proving most useful for giving practical training to the students attending both the farm planning and survey courses.

FISHERIES TRAINING CENTRE, MWANZA

1. STAFF AND GENERAL.

The staff of the Fisheries Section of the Development Division run training courses, partly in co-operation with Training Institute, Ukiriguru, in fisheries work. Considerable progress and development were achieved despite many difficulties including shortages of clerical staff and text books and a long illness of the officer-in-charge. This work was done in addition to the normal commitments of the staff in extension work and collection of statistics.

2. COURSES.

Instruction in swimming formed the first part of every course.

Main Course. The main course at Mwanza which began on 6th November, 1961 and is due to end on 31st July, 1963, consists of two parts. During the first year, half the week is spent at Ukiriguru taking the same subjects as other Agricultural Students while the remainder of the week is spent at the Fisheries Training Centre. The second year is being spent wholly at the Fisheries Training Centre and includes extensive safari and field work with the trainees often working without supervision. Although theoretical subjects are included, the emphasis is on practical work.

After a three-month practical course, an advanced course in fisheries and administration was given to 2 pupils with higher educational qualifications. They were also put in charge of safaris and gave valuable assistance to the fisheries officers.

Boat Building. Instructions in the art of building modern fishing boats was given to a total of 5 apprentice boat builders.

Commercial Fishermen. 15 young commercial fishermen were given free instruction in net mounting, net mending, the preservation of fish, the production of fishmeal, boatmanship and the maintenance of outboard engines.

School Course. In co-operation with a boys' school at Ibadakuli, Shinyanga, a dam was stocked with fish, a boat and gear supplied and a course given in fishing methods. This course proved popular and rewarding.

3. INTAKE.

There were 10 students on the two-year course, of whom 2 went for further training in Israel and one failed his first examinations and was returned home. The 2 students on the special course went for further training abroad (one in nuclear physics). In the boat building course five began and two left as they were uncertain of the future of the course.

4. LIFE OF THE INSTITUTION.

Early in the year when teaching and living accommodation were cramped and unsatisfactory, there was general dissatisfaction among the students, but now morale is good and keenness evident. Fishing excursions though arduous were popular, the digging of a fish pond not quite so popular. A fish drying house was built.

5. DEVELOPMENT.

The school and dormitory were completed.

ANIMAL DRAUGHT TRAINING CENTRE, URAMBO

During the year the building programme and land preparation made good progress. Courses will begin in early 1963 to train the people who will run the numerous ox-training centres being set up all over the country.

AGRICULTURAL COLLEGE, MOROGORO

Following the visit of the team from the University of West Virginia led by Dean Nesius at the end of 1961, a "Final Report and Recommendations on Agricultural Education in East Africa" was published in May, 1962.

As the University of West Virginia are the consultants to the United States Government Agency for International Development, the acceptance of proposals as outlined in the report virtually constituted official approval in principle.

A visit later by the architects from West Virginia resulted in production of a set of plans in conjunction with the local architects appointed by Compoworks. These plans proved to be somewhat grandiose and exceeded the financial provision planned, and so replanning was commenced.

The land at Morogoro was approved and steps to acquire some township land, the Agricultural Farm and part of a neighbouring sisal estate were inaugurated, to give a total holding of 796.5 acres.

Fifteen students from the M.A.T.I., Tengeru left for West Virginia to start their agricultural diploma studies, and so in fact the college was opened on a foreign campus. At the same time higher degrees were being studied by existing diploma staff with the intention that they later fill teaching posts at the College.

MSINGA FARMERS' TRAINING CENTRE, KILIMANJARO

1. STAFF AND GENERAL.

Msinga is our first Farmers' Training Centre. It was generously financed by United States A.I.D. on a suitable site obtained from the Moshi Native Coffee Board. Most of the year was occupied in preparation of the farm, building work, recruitment and training of staff and preparation of curricula. The centre was opened by the American Chargé d'Affaires on 19th December.

The main purpose is to give short practical courses in aspects of improved Crop and Animal husbandry to farmers in the Northern Region.

2. INTAKE AND COURSES.

The first course was run in December. This was for 20 Kilimanjaro farmers on better coffee culture particularly pruning and spraying. Apart from the main subject, lessons were given in vegetable growing and maintenance of fertility; films, outside lectures and excursions were arranged.

3. DEVELOPMENT.

Very heavy clearing work was done and the farm laid out with arable fields, coffee nursery plots, fodder plots, vegetables and fruit trees for teaching purposes. The old house on the plot had been extensively rehabilitated by the end of 1961. The existing coffee factory was renovated. The area was fenced and the furrow re-aligned. Farm buildings

were constructed—cattle shed, dairy, milking shed, food store, piggery, poultry house, cattle spray crush and hay shed, using local material as much as possible. The school buildings, consist of classrooms, offices, dormitories, cooking, eating and washing facilities for 20 farmers. The farm was stocked with Jersey cattle, local cattle, pigs and hens to demonstrate animal husbandry methods.

IRINGA FARMERS' TRAINING CENTRE

1. STAFF AND GENERAL.

This Farmers' Training Centre was also supported financially by U.S. A.I.D., and was laid out and constructed on land excised from the Ministry of Agriculture's experiment farm at Seatondale near Iringa. The year was spent in preparation of the site, construction of buildings and preparation of curricula.

2. DEVELOPMENT.

At the end of the year preparations were virtually complete, apart from minor work. The farm buildings were made of local materials, and the farm area was fenced and the fields laid out.

FURTHER FARMERS' TRAINING CENTRES

At the end of the year plans were in various stages of preparation for further Farmers' Training Centres at Malya (Lake Region), Urambo (Western Region), Hombolo (Central Region) and Mahiwa (Southern Region), and tentative arrangements were made for one at Kibaha (Eastern Region).

GALANOS AFRICAN AGRICULTURAL SCHOOL

The Director of Training acts as Executive Officer to the Board of Trustees, which was set up by Government to administer a bequest from the late Mr. Christos Galanos to build and equip a school for the instruction of Africans on Agricultural and kindred subjects. It is hoped to commence building in 1963.

TRAINING OUTSIDE TANGANYIKA

Owing to the lack of facilities at present available for higher training in Tanganyika, officers of the Ministry are sent outside the country for a wide variety of courses—some leading to formal qualifications and others being in the form of study tours on particular problems.

In addition to 20 officers already overseas before 1962, a further 83 departed during the year. Of these, 11 Assistant Field Officers did a six-months study tour of Extension Training in the U.S.A. and Greece, and at the end of the year there were 92 officers studying in the United Kingdom, U.S.A., Australia, Canada, New Zealand, Denmark, Kenya and Sudan.

The numbers on the different type of courses were as follows:—

Degree in Agriculture	...	...	...	...	6
Degree in Veterinary Science	...	...	...	...	13
Diploma and Certificate in Agriculture...	...	...	...	...	44
Diploma in Animal Husbandry	...	...	...	...	6
Diploma and Certificate in Poultry	...	...	...	...	4
Diploma in Engineering and Building	...	...	...	...	5
Study Tours:					
(a) Extension Methods	...	...	...	...	3
(b) Dairy Production	...	...	...	...	2
(c) Poultry	...	...	...	...	2
(d) Irrigation Engineering	...	...	...	...	1
(e) Miscellaneous	...	...	...	...	2
Post-graduate Diplomas in Entomology, Plant Pathology, Chemistry, Laboratory Technology					4

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PUBLICITY SECTION

The Agricultural magazine "Ukulima wa Kisasa" continued to prosper during the year. Circulation declined slightly and was running at about 18,000 copies a month at the end of the year. Attempts to step up the circulation by using the Tanu Youth League organization as distributors did not prove successful though the idea has not yet been abandoned. An innovation during the year was the setting of the centre pages in the form of an instructional booklet. Booklets so far published have dealt with tea, onions, poultry, cashew and hides and skins. Five thousand reprints of each booklet have been obtained for issue free on request by farmers. Letters are coming in at the rate of about 500 a month for these reprints. The magazine now pays not only its own production costs but also the cost of distribution.

The quarter hour radio programme continues to be popular and recordings are regularly received from correspondents in the Regions. In addition, 17 broadcasts were made by the Junior Minister. The object of these broadcasts was to make the public aware of the work the Ministry was doing and also to draw attention to the importance of good husbandry.

CONCLUSION

I wish to record my appreciation of the support and co-operation the Division has received from all officers of the Ministry and other officers of Government.

F. E. OMARI,
Director of Training



TANGANYIKA

MINISTRY OF AGRICULTURE

Annual Report
of the
Water Development and Irrigation
Division
1962

1964

PRINTED BY THE GOVERNMENT PRINTER
DAR ES SALAAM

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MAGU WATER SUPPLY

9,600-gallon storage tank and delivery main to village

ANNUAL REPORT OF THE WATER DEVELOPMENT AND IRRIGATION DIVISION, 1962

I.—INTRODUCTION

The Water Development and Irrigation Division of the Ministry of Agriculture is responsible for providing rural domestic water for humans and animals, for the conservation of water to improve river flow and prevent floods, for the execution of irrigation schemes, for hydrological investigations and for long-term planning of major water development works. Throughout the country there is an increasing pressure for general development, and as the demand grows for higher living standards, increased agricultural production and the better utilization of grazing land, so there is a corresponding need for new and improved water supplies for domestic use, irrigation and stock. It is the function of the Water Development and Irrigation Division to supply this need.

2. The Ministry of Agriculture, of which the W.D. & I.D. forms one Division, underwent a major re-organization in July, 1962, as a result of which the number of Divisions was increased and now includes Administration, Agricultural Extension, W.D. & I.D., Development, Veterinary, Research, and Training. This re-organization brought little change to the functions and responsibilities of the W.D. & I.D., except that the Technical Assistants' Training Course at Ubungu passed over to the Training Division.

3. The process of handing over responsibility for workshop maintenance and overhaul of W.D. & I.D. mechanical plant and transport to the Electrical and Mechanical Division of the Ministry of Communications, Power and Works is nearly complete and now only the Dodoma depot in the Central Region remains to be transferred. In order to handle directly the fabrication of minor items required in connection with the construction programme; all regional depots of the W.D. & I.D. continue to maintain small workshops of their own.

4. Although the overall staff position has been maintained without marked deterioration, there are some weaknesses which are a serious handicap to the work of the Division, at a time when the importance of the Project Planning and Research Station at Ubungu is increasing, it is especially unfortunate that the Division has lost the services of several of its most experienced Technical Assistants engaged on Hydrology, and the situation has been aggravated by the continued vacancy of the post of Chief Designs and Research Engineer. Also a source of concern is the continued lack of success in recruiting Civil Engineers, both locally and from overseas, and at the present time there are some 10 vacancies with little prospect of early filling. On the credit side, a Senior Hydrologist has been recruited, and strenuous efforts are being made to accelerate the technical training programme.

5. The year has again been characterized by widespread floods with famine conditions persisting in certain areas, particularly the Central Region, and parts of the Northern Region. These unfavourable conditions have combined to diminish the financial resources of some Local Government Authorities, and this state of affairs has been partly responsible for the decreased utilization of the earthmoving teams. On the other hand, widespread support for self-help or Nation-Building Schemes has resulted in many small water development works being undertaken throughout the country, the overall effect of which on the territory's economy is very important. In the better watered areas, there is growing evidence of the increasing interest of local farmers in village irrigation schemes, and the progress recorded in this direction during the year is encouraging—it is anticipated that this class of work will play an increasingly important role in the annual W.D. & I.D. programmes of the future.

6. There was an unfortunate general slowing-down in works construction which affected all Regions during the most favourable dry time of the year due to financial considerations, and this is a further reason for the drop in capital expenditure from £902,086 to £652,534: weather conditions were yet another important contributory factor.

7. The programme of water control works carried out during the year has been an important one and includes such items as river training, improvements to flood control dams and irrigation schemes, also reconstruction of the spillway on Igombe dam which suffered damage during the unprecedented floods of 1961/62. As the tempo of development throughout the country increases, so the demand for water control works will expand in order that vital communications, valuable farm land and buildings can be protected from floods.

8. The total expenditure for 1962 shows a considerable decrease on the previous year and some reasons for this have already been mentioned above; more information on this subject will be found in the appropriate chapter of this report. A total of 21 piped water supplies were completed as compared with 44 in 1961, and as regards earth dams and charcos 9 were completed as against 13 the previous year. The programme of water boring by percussion drill proceeded steadily, as a result of which 17 new boreholes were completed compared with 38 the year before. Expenditure on water supplies for Rural Local Authorities amounted to £131,750 which is little more than half the figure for the previous year, but expenditure for water control works increased to £109,055. A new item for Major Projects (Surveys and Investigations) accounted for £70,059 as against "nil" expenditure in 1961, and there was an increase to £38,895 for water supplies for other government departments.

9. The growing importance of hydrological investigations in connection with future plans for development of the country's water resources continues to be recognized, and following the appointment of a Senior Hydrologist steps have been taken to review the network of river gauging stations and other installations and to bring them up to a higher standard. As already mentioned, the Hydrological Section has lost a number of its more experienced field officers and one of the Division's main endeavours must be to replace these as soon as possible and to continue with a steady build-up in staff and facilities. The publication of the Hydrological Year Book has been held up as a result of typing and reproduction delays, but the work is now virtually complete. This first volume, which covers the period 1950-1959, includes records from 244 stations of different classifications, representing a great mass of technical data. It is hoped that subsequent issues will be published annually and will cover fully all aspects of the hydrological work carried out during the year.

10. The Division has continued to receive valued assistance from the team of F.A.O. experts, whose work has been concentrated during the year mainly in the Wami River Basin and the Coastal Belt of the Eastern Region; in addition, however, these experts have prepared preliminary reports on a number of smaller projects, such as the Lukuledi River, some of which await formal publication and issue from F.A.O. Headquarters in Rome. More detailed investigation and surveys of selected areas and projects within the Ruvo and Rufiji River Basins have proceeded smoothly with the assistance of technical teams from France and Switzerland: as a result detailed proposals will shortly be available for several pilot schemes, each of several hundred acres and also outline proposals for flood control measures which would make a major contribution to the regulation of the Ruvo River. The successful establishment of a 50-acre pilot pumped irrigation scheme on Lake Victoria, which was constructed by this Division with Israeli technical aid is especially significant.

11. The date for the implementation of an important project designed to develop the water resources of the Pangani River has been brought appreciably nearer by the receipt of the Draft Report of the Engineering Consultants, Sir William Halcrow & Partners. This Draft Report, to be followed shortly by the Final Report, follows the carrying out of an extensive programme of surveys and investigations, as a result of which it should soon be possible to go ahead with hydro-electric power generation and irrigation projects of a substantial nature.

12. The year has seen encouraging progress in many branches of the work of the W.D. & I.D., but if this is to be maintained and improved on in the years ahead, urgent consideration must be given to steps designed to improve the training and recruitment of both technical and professional staff, particularly Civil Engineers, for whom there is a worldwide demand in excess of supply.

II.—ORGANIZATION

13. The Headquarters of the W.D. & I.D., are in Dar es Salaam and there is a branch office in each of the nine regions. In addition there are five sub-offices operational in Moshi, Singida, Same, Korogwe and Iringa. The Engineering Geologist's headquarters are in Dodoma, and the Project Planning Station, including the Hydrological Section and the Technical Assistants Training School is at Ubungu on the outskirts of Dar es Salaam.

14. The Water Development and Irrigation Division has continued under the Ministry of Agriculture which has however been reconstituted during the year so that there are now seven Divisions in the Ministry, namely Administrative, Agricultural Extension, Water Development and Irrigation including the Water Office, Veterinary, Research, Development and Training. The Co-operative Division was transferred to a new Ministry during the year. The Training School at Ubungo, along with all other training centres in the Ministry, was put under the control of the new Training Division, which is now responsible for all training.

15. The transfer of the responsibility for the maintenance and overhaul of mobile plant and equipment to the Electrical and Mechanical Division of the Ministry of Communications, Power and Works continued, and at the end of the year the hand-over was complete in eight of the nine regions, leaving only the large W.D. & I.D. workshop in Dodoma to be transferred. Throughout the country the W.D. & I.D. remained in charge of field maintenance of its own plant and retained the use of its own workshops for its constructional activities.

16. Ministry of Agriculture Regional Accounts Units were set up during the year in nearly all regions and these took over all accounting work from the W.D. & I.D., and other Divisions of the Ministry. This centralization relieved W.D. & I.D. of a large amount of office work.

17. The final handing over of stores to the Stores Division of the Ministry of Communications, Power and Works, was completed during the year by the transfer of the large holdings in the W.D. & I.D. store at Dodoma to this organization.

18. The increased divisional activity in Tanga Region, and particularly in Same District, called for the extension of office and depot accommodation there, and land for a new depot in Same was acquired and a combined office/stores building constructed. With continued inactivity in water development works in Southern and parts of Northern Region the sub-depots at Masasi and Mbulu remained closed and it was also found necessary during the year to close down the Ngorongoro sub-depot for the same reason. Two dormitory blocks for the Training School at Ubungo were constructed.

19. Short-wave radio communications were extended to give cover to the difficult-of-access Rufiji Basin with encouraging results, and at the end of the year it was proposed to equip one of the drilling rigs with a radio set as an experiment.

III.—STAFF

20. Mr. I. L. Ward, who was Head of the Division from 1959 to 1962, left the country on retirement in May and was succeeded as Commissioner by Mr. S. L. Paterson, who had previously held the post as Deputy Commissioner.

21. On the 1st July the designation of the Head of the Division reverted to Director from Commissioner as previously.

22. The overall position in the professional and senior technical grades improved during 1962 with the arrival of a Senior Hydrologist, and Executive Engineer and six Technical Assistants, Grade I from the United Kingdom on first appointment, but satisfaction at this state of affairs was tempered by the fact that on the 31st December, 1962, notices of retirement or resignation were held in respect of 10 per cent of the total establishment of 80 officers in these top grades.

23. The post of Chief Designs and Research Engineer (previously Chief Planning Engineer) remained vacant throughout the year.

24. During 1962 the whole of the Mechanical Staff, from Mechanical Engineer down, were transferred from W.D. & I.D. to the E. & M. Division of the Ministry of Communications, Power and Works. Of Chief Inspectors and Inspectors (Mechanical) posts, as many vacancies as filled posts were handed over during the course of this exercise.

25. The following table shows the position of senior posts in the Division as at 31st December, 1962:—

Category	Establishment	Posts Filled	Vacancies	Vacancy Percentage
Senior (Staff Grade) Officers	8	5	3	37.5
Professional Engineers and Geologists ...	26	18	8	30.8
Senior Engineering Assistants and Engineering Assistants, Grade I ...	46	37	9	19.6
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26. A number of promotions, mainly of African staff, to Technical Assistants Grade II improved the position at this level to the extent that there were only 25.7 per cent vacancies at the end of the year and the Division's strength in this grade seems likely to be maintained.

27. The post of Senior Draughtsman was filled in January, 1962, by a local appointment and the year ended with the Drawing Office staff almost at full strength.

28. Further resignations from Inspectors (Drilling) were partly offset by the recruitment of two new officers from the United Kingdom and on the 31st December there were two vacancies existing with a further one pending.

29. Clerical staff were up to full establishment almost throughout the year, but will inevitably be weakened when six of the existing Office Supervisors, Grade I and II, now under notice of retirement, leave during 1963.

30. One Tanganyikan continued his post-graduate training in Civil Engineering in the United Kingdom where he remained throughout the period under review. The hoped for Pupil Engineer recruits from graduates of the Royal College, Nairobi, were not forthcoming however and prospects of filling existing and pending vacancies in the Executive Engineer cadre from local sources remain doubtful in the foreseeable future.

31. The Fifth Ubungo Training Course for Technical Assistants Grade V was completed at Ubungo in June and thereafter the responsibility for further courses was transferred to the Training Division of the Ministry.

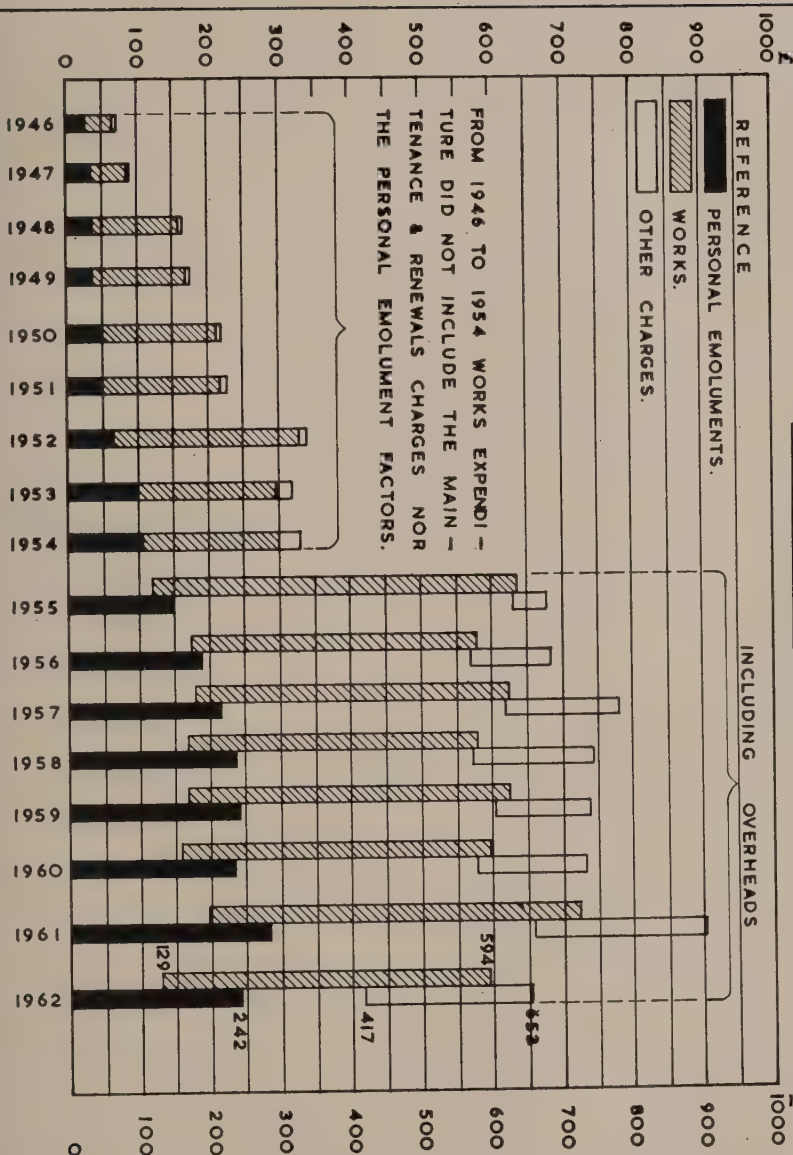
32. Staff from the Division represented Tanganyika at:—

- (a) A meeting of the Executive Committee of the International Commission on Irrigation and Drainage held in Israel in June, 1962.
- (b) Meetings with representatives of the U.A.R. and the Sudan on the use of the Nile waters held in Nairobi, and Kampala in July, 1962.
- (c) An International Near-East Trade Fair at Tel Aviv in June, 1962, where Tanganyika had an exhibition stall.

IV.—FINANCE AND EXPENDITURE

33. Expenditure in the calendar year of 1962 and in the previous year is shown in the table below and is illustrated diagrammatically on the expenditure chart of the next page.

Item	Details of Expenditure	Expenditure 1961 £	Expenditure 1962 £
<i>1. Recurrent:</i>			
	Personal Emoluments	280,907	242,121
	Other Charges	243,357	235,883
	Special Charges Expenditure	597	794
	Total Recurrent...	524,861	478,798
	<i>Less Appropriations-in-Aid</i>	<i>149,787</i>	<i>291,484</i>
	Net Total Recurrent ...	375,074	187,314
Item	Details of Expenditure	Expenditure 1961 £	Expenditure 1962 £
<i>2. Capital:</i>			
	Water Supplies (Capital Equipment)...	55,815	67,325
	Water Supplies (Construction)	37,220	16,957
	Water Supplies (Surveys and Investigations) ...	83,030	31,184
	Major Projects (Surveys and Investigations) ...	—	70,059
	Water Supplies (Rural Local Authorities) ...	253,736	131,750
	Water Control	84,775	109,055
	Ngorongoro Compensatory Supplies...	5,492	—
	Water Supplies (Other Government Departments)	6,944	38,895
	Total Capital Expenditure ...	527,012	465,220
	Total Expenditure ...	902,086	652,534

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34. An examination of the above table, shows that expenditure in 1962, was less than in 1961 under almost all items, whereas the Appropriations-in-Aid, are almost double the figure for 1961. The following points are offered in explanation. The reduction in Personal Emoluments is due to the transfer of all the staff of the mechanical section to the E. & M. Division of Compoworks, in July, 1962, making a saving of about £15,000 and to the fact that a number of senior officers retired from the Division towards the end of 1961. The extremely severe wet season at the beginning of 1962, coupled with a four-month period from July to November when funds for construction were available only in limited amounts while awaiting the outcome of financial negotiations, was responsible for the decrease in Capital Expenditure. The increase in Appropriation-in-Aid is explained by a reassessment of Hire and Renewal charges on Works Plant and Transport; these rates were low and almost all were adjusted in an upward direction.

35. The increase in Appropriations-in-Aid (*which includes P.E.F. charges), combined with the other factors caused a reduction in net total recurrent expenditure to almost half the 1961 figure. The unusually large jump in Appropriations-in-Aid which, as stated above, was caused mainly by an upgrading of the Hire and Renewals charges on vehicles and equipment led consequently to increased Capital Expenditure, so that this is not strictly comparable with the 1961 figures. A true comparison after deducting difference in Hire and Renewals charges, shows that the construction programme in 1962 was approximately 75 per cent of the previous year.

36. Although about half of the construction year was lost due to the causes mentioned above, it was possible to proceed with surveys and the preparation of schemes. As a result once adequate funds were available, the output was at a high rate.

37. As in previous years, work for Rural Local Authorities was on the basis that the Local Authority would pay 25 per cent of the cost. In addition, on smaller jobs it is becoming more common for Local Authorities to pay the full cost of the work. This applies in particular to boreholes and borehole headworks. There is no particular rule as to when a Local Authority pays 25 per cent or 100 per cent, except that on small jobs Local Authorities are inclined to pay the full amount rather than wait to see if Government assistance is available.

38. Expenditure item under Major Projects (Surveys and Investigations) was new and of a sizeable amount, and was spent mainly on the investigation of the Pangani Basin, by Sir William Halcrow and Partners, and on work for French teams and a Swiss team, in the Ruvu Basin, and on the Lumemo River respectively.

39. *The Personal Emoluments Factor (P.E.F.) is an allowance for overhead expenses including the salaries and allowances of field staff, and is charged on all Capital Expenditure except Surveys and Investigations (Water Supplies and Major Projects). The factor is charged as a percentage on cost, and was the same as in previous years, namely: Dams 40 per cent, Gravity pipelines 30 per cent, Boreholes 100 per cent, Open wells 50 per cent and Pumped water supplies 40 per cent.

V.—MINOR SURVEYS AND EXPLORATORY WORK

40. As in previous years, the design and construction of numerous water development and irrigation works throughout the territory necessitated the carrying out of many reconnaissances, site investigations, including soil and water sampling, and topographical surveys. Every proposal for a water development scheme requires a technical examination which usually calls for topographical surveys and frequently hydrological investigations, the sinking of trial pits, tests of soil, analyses of water, etc. Very often comparative studies of several places have to be made before a firm recommendation can be put forward as regards the site of a dam, an irrigation off-take from a river or a borehole. Particularly detailed investigations are necessary before the design of engineering works to control flooding of rivers. Such activities occupy a very large proportion of the time of the technical staff, and although investigations of this nature are not always directly productive, they form an important and essential part of this Division's duties.

41. Although the minor surveys and investigations are too numerous to describe in full, mention may be made of a few which could be regarded as typical and conveying a general impression of this part of the W.D. & I.D.'s work. The proposed Madahuli pipeline, designed to bring water for domestic and livestock purposes to a wide area lying in the

triangle between the Manonga and Wembere Rivers, necessitated a location survey for the alignment of over 50 miles of piping; in addition, foundation studies and site surveys were needed for the design of an important earth dam at Mwamapuli to supplement the supply from the existing dam at Bulenya Hills: river training and flood control problems on the Morogoro River, particularly within the township boundaries, required detailed surveys of the river course extending over 1½ miles—this is a continuation of earlier work which led to the design of a gabion training wall upstream of the main road bridge: similar river training problems on the Mkundi River led to surveys of the old river channel over a distance of four miles between the recently completed gabion wall and the main road: in this case, the survey was found necessary to investigate the cause of the continued erosion of the river bed: village irrigation development in the Gonja area of Tanga Region has called for a varied programme of investigation and survey, including two dam sites, a short tunnel alignment and an irrigation development area of some 500 acres: lower down the Pangani Valley, at Mombo, planning has been proceeding in connection with a 1,000-acre irrigation scheme incorporating a regulator on the Mombo River—as in the previous case, foundation investigations and contoured surveys were carried out: the settlement of several thousand refugees in the Ngara District of the West Lake Region has posed important water supply problems, to solve which numerous topographical surveys for small hand-built dams have been executed: the Kitengule Plains ranching scheme also in the West Lake Region has posed some difficult water supply problems, which have been investigated by the sinking of trial boreholes and Banka drilling holes, in addition a survey has been carried out in connection with a possible pumped supply from the Kagera River: another ranching scheme, this time at Zoissa in the Central Region, called for a general study of ground water resources by geophysical means, in an area where conditions are not particularly favourable for borehole water supplies.

42. In addition to the foregoing, there have been the usual innumerable surveys for small dams and Nation Building schemes on a self-help basis which have kept the staff fully engaged in all Regions.

43. The Water Boring Section carried out 38 geological/geophysical surveys for borehole sites, distributed all over the nine Regions with the exception of Western, Southern and Southern Highlands: of the above, 25 were undertaken for Local Authorities, 4 for Government Departments, 8 for private clients and one exploratory survey for Divisional information. This work involved 271 depth probes to between 150 ft. and 700 ft., and 15 constant separation traverses totalling 38,170 ft. in length. Geophysical forecasts had a success rate of 73·8 per cent.

44. The diamond drilling programme suffered from the fact that the operator was absent on leave for a short period during part of the year, but extensive exploratory drilling was carried out on the sites of the proposed Jangalo Dam in Central Region and the proposed Kidunda Dam on the Ruvu River, the latter as part of the investigatory work which this Division is carrying out for a French Technical aid team. In all 29 holes, totalling 1,107 ft. were drilled.

45. The soil and water-testing laboratory at the Project Planning Station was brought to a high standard by a generous gift of equipment from the Food and Agriculture Organization of the United Nations, and it is now capable of carrying out soil tests for most Divisional purposes, also analyses of water samples for domestic potability. During the year 397 soil samples were tested for engineering properties and 310 water samples for domestic and/or irrigation use.

VI.—HYDROLOGY

46. The Hydrological Section, based on the Project Planning Station at Ubungu, is currently being re-organized following the attachment of a Food and Agriculture Organization Hydrologist in the early part of the year, and the appointment to the permanent establishment for the first time, of a Senior Hydrologist later in the year.

47. When re-organization is complete, direct control of all main hydrological work will be centered on Ubungu and "in-service" training of hydrological staff (which has already commenced) will form an important part of the work.

48. A complete re-assessment is being made of all existing gauging stations, with a view to a rise of standards to internationally accepted levels, and leading to a general streamlining of the hydrological organization.

49. It is proposed that the main link between the central organization and field workers will be through Regional Hydrological Officers, who will take over duties formerly carried out by the Regional Water Engineers. One Regional Hydrological Officer was established in Tanga to cover operations in the busiest area, comprising the Northern and Tanga Regions others will follow as staff and funds become easier.

50. The implementation of the re-organization plan has placed a considerable amount of extra work on Ubungo staff, and more experienced staff at the higher grade of Technical Assistant level are urgently required, particularly since the loss of such staff during the year. This problem must be overcome, particularly as the amount of "in-service" training that can be given to junior staff depends on senior staff being able to spare time for this work. Experience this year with "in-service" training has shown that excellent results can be obtained, especially with staff already having experience in lesser hydrological duties who are keen to fit themselves for higher posts. The training of newly appointed staff requires considerable extra time. Undoubtedly a separate training establishment for hydrological specialist staff is now required if the important work done by this section is to continue at the present rate, let alone expending its activities to cover further important areas of the country.

51. The Hydrological Year Book was prepared for the printers in November. The Year Book, which covers the period 1950-1959, includes 88 "A" and "B" Regular Gauging Stations; 110 "C" Stations; and 46 unclassified stations with gaugings included prior to rating. "A" stations are classified with regard to their position and reliability in the individual catchments. "B" stations are classified on a similar basis, but are complementary to "A" stations in respect of overall consideration of the hydrological network. "C" stations are those which do not rate well, or have a paucity of records. All "A" stations have hydrographs appended. The Year Book is expected to be published in the early part of 1963.

52. During the first half of the year, field gauging programmes and other activities were considerably curtailed because of the abnormal rains, interruption of communications, and general flooding. Particularly affected was the intended erection of several new gauging installations, the Kilombero catchment suffering most in this respect. The team at Steigler's Gorge, Rufiji, was isolated from February to June and an air drop had to be made to supply them with food. The station at Furua, on the Kilombero, was found to have suffered complete change of control because of excessive bank and bed erosion and it is no longer of any value as a Regular Gauging Station. Damage to other installations was not found to be excessive, considering the extent and duration of the floods, but nevertheless many repairs and re-surveys had to be carried out.

53. The Current Meter Rating Tank at Ubungo was constructed and all that now remains to be done, in order to utilize the tank, is the installation of the rating equipment, for which an allocation of funds is awaited. A useful consignment of automatic water level recorders and gauging equipment was received, the former being earmarked for several important Regular Gauging Stations—the installation of automatic water level recorders will lead to a great improvement in the accuracy of records from these stations.

54. Two new Meteorological Stations were established, one at Kyela, Rungwe District, Southern Highlands Region, and the other at Wami Prison Farm in the Wami catchment; also, improvements were made to Lumemo Meteorological Station at Ifakara. The important recorder at Kidatu on the Great Ruaha was removed prior to re-siting at a more suitable location. Cable-car installations were erected over the Lufirio and Ruhuhu rivers in Southern Highlands Region, and many improvements to control at several gauging stations were carried out.

55. The demand for hydrological information was again very heavy, due mostly to an increase in survey and investigation teams from abroad who covered several potential irrigation areas in the Eastern Region, particularly the Kilombero Valley and the Ruvu Basin. The Project Planning and Research Station, Ubungo continued to supply information on stage-discharge relationships on the Pangani River to Sir William Halcrow and Partners, Consulting Engineers, for their investigations into the proposed Nyumba ya Mungu dam.

56. Considerable information was requested by the Water Officer for hydrological studies in respect of applications for water rights throughout the country, and the close exchange and reciprocity of information with the East African Meteorological Department at Dar es Salaam was continued.

VII.—MAJOR PROJECT PLANNING

57. As in previous years, considerable emphasis has been placed on the study of major water development and irrigation projects in different parts of the country; these projects include general utilization of the water resources of the Pangani River Basin, with special stress on hydro-electric power and irrigation; flood control and irrigation in the Ruwu River Basin; pilot irrigation schemes in the Kilombero tributary of the Rufiji River, and also in the Lake Victoria catchment; and finally general development of the water resources of the Wami River Basin.

58. Following the appointment in 1961 of the Engineering Consultants, Sir William Halcrow and Partners, with wide terms of reference covering the water resources of the Pangani River Basin, investigations and survey work continued in the field during the first half of 1962. This work has embraced many aspects of the problem, including agronomy and soils, as well as engineering and hydrology. The Consultants' preliminary draft report was received in November and their final report is expected early in 1963. There is every reason to hope that as a result of the encouraging nature of the report the way will shortly be clear for major development works within the Pangani River Basin, leading to large scale irrigation schemes and augmented supplies of electricity generated by hydro-electric power.

59. With the outline plan for development of the Ruwu River Basin, prepared by Mr. Chablani and issued by F.A.O. in 1961, as an invaluable basis for more detailed studies, French technical aid teams have been in the field for much of the year commencing with a reconnaissance party from January to April. Other teams followed and, in close collaboration with the W.D. & I.D. and other Divisions of the Ministry, preliminary plans were prepared for the pilot irrigation schemes; also for a programme of exploratory drilling and topographical mapping at Kidunda, where conditions favour a major flood control dam.

60. The sites selected for the two pilot schemes are at Kwala, in the lower Ruwu Valley and at Mvuha, situated below the south-east slopes of the Uluguru Mountains; in each case the schemes are being designed for approximately 800/1,000 acres in the initial stages. At Kwala, the cultivated area will be protected by a polder in the flood plain and served by pumping and drainage facilities. For the Mvuha scheme, gravity irrigation is intended with an off-take structure sited on the Mvuha River. Survey and design work is well advanced at Kwala, but in the case of Mvuha it is still in the early stages.

61. The reach of the Ruwu River between Kidunda village and the confluence of the Mgeta tributary has for some years received special attention as offering favourable conditions for construction of a major flood control dam. This year, in collaboration with members of the French Technical Team, W.D. & I.D. has carried out an extensive programme of diamond and percussion drilling, combined with the measurement of permeability. In addition, this reach of the river has been resurveyed and contoured maps have been prepared.

62. Among the more important pilot irrigation schemes recommended for study in the Rufiji Basin Survey Report was Lumemo, situated near Ifakara in the Kilombero Valley. A technical expert made available by the Swiss Government visited the area during the year and submitted proposals for preliminary surveys and investigations aimed at the design of an irrigation scheme, which might ultimately extend over 2,500 acres. A Water Development and Irrigation Division survey team prepared the necessary contour plans covering both the headworks site and the irrigation area and these have since been dispatched to Switzerland for incorporation in the project proposals.

63. The importance of the irrigation development potential in the Lake Victoria catchment area has long been recognized and, with Israeli technical aid and the active support of the Victoria Federation of Co-operative Unions, a 50-acre pilot pumped irrigation scheme is now in operation on the eastern shores of Smith Sound. The pumping equipment and distribution piping were installed at short notice and with great speed by W.D. & I.D. and the results of the experimental work are being watched with interest.

64. As in previous years, this Division has been responsible for the provision of technical advice in the engineering sphere to the Tanganyika Agricultural Corporation irrigated farm at Mbarali. A potentially serious river training problem upstream of the main headworks was studied during the year and a report submitted. In addition, an accelerated development programme was drawn up, combined with estimates of capital and recurrent costs, for both gravity and overhead irrigation.

65. Problems connected with the waters of Lake Victoria in the Nile catchment have called for considerable study and discussion, including several meetings of the East African Nile Waters Co-ordinating Committee. Informal technical talks were held between representatives of the three East African countries and the Permanent Joint Technical Commission (representing Egypt and the Sudan) in Nairobi and Kampala in July; these talks attended by the Director of W.D. & I.D. served a very useful purpose, and the decision was then taken to continue the discussions in Cairo in March, 1963. The approach to the problems of discharge control and storage in Lake Victoria have been considerably complicated by the unprecedented rains and lake levels experienced in 1961/62 and have necessitated reviews and reconsideration of theories on the Lake's behaviour previously accepted as reliable.

VIII.—DOMESTIC AND CATTLE WATER SUPPLIES

66. The water supplies discussed in this chapter, except those mentioned in the final paragraph, are for domestic and stock use, and were all provided at the request of the Local Authorities. Normally each scheme received 75 per cent assistance from Government, but in the case of some small projects, the Local Authority paid the full amount. Upon completion, each scheme is handed over to the Local Authority to whom it then belongs, and upon whom falls the responsibility for maintenance and operation. Government assists with maintenance only upon request and reimbursement of cost.

67. There is always a great demand for water supplies of this type, and the limiting factor is the availability of funds. There are many cases where the Local Authority cannot meet the 25 per cent contribution, resulting in the scheme being dropped and the number of such cases has risen greatly in Central and Northern Regions during 1962, as a result of famine and flood. The inability of some Local Authorities to find the 25 per cent share, has not as yet affected the total output of water supplies, but it has tended to shift the bulk of the work into those areas where Local Authorities are more affluent. Such areas are Lake Region generally, and Kilimanjaro District. There has been an upsurge in the construction programme in Tanga Region, for the same reason.

68. During the year 59 new domestic water supplies were under construction, and in addition, improvements and extensions were carried out on 22 existing schemes. Of the new supplies under construction, 30 were completed and are now in operation, and 11 improved supplies were put into service. Of the new supplies 21 were gravity pipelines and pumped supplies from springs or streams, making available an additional 1,070,000 gallons of water per day. Nine storage reservoirs were completed, to conserve an additional 1,011 acre feet of water. With reference to reservoirs, the tendency in the Division is to move over to the construction of smaller dams and charcos, and away from the bigger dams: this will encourage the dispersal of water supplies, and should lead to larger numbers of small but adequate supplies.

69. The works carried out in the various regions are described briefly below, and further details are given in Appendix I:—

- (a) *Eastern Region.* A dam and a pumped water supply were provided to St. Andrew's College, Minaki, also work was under way on 4 borehole water supplies for domestic and cattle use in different areas. An earth dam was constructed at Gairo in Kilosa District, for domestic and stock purposes, and three wells were sunk for the Forest Division in Morogoro District.
- (b) *Central Region.* Two earth dams were constructed for domestic and cattle watering, and repairs and improvements were under way on six others. Eight pumped supplies from boreholes for cattle and domestic watering were under construction, of which four were completed.
- (c) *Western Region.* One earth dam for domestic and cattle watering was completed during the year, and improvements carried out to another.
- (d) *Lake Region.* Four earth dams, and three charcos, were completed or under construction for domestic and cattle supplies. In addition, improvements and repairs were carried out on four dams. Three pumped water supplies were provided, one from Lake Victoria, one from a borehole, and one from a sand river.

- (e) *West Lake Region.* One new pumped supply using a hand-pump on a borehole was put into service, and minor improvements were carried out to the intake of a pipeline. Automatic water dispensers were installed in existing water kiosks at three water supplies constructed in previous years. An extensive borehole drilling programme is under way.
- (f) *Northern Region.* Fifteen gravity pipelines providing cattle and domestic water were under construction, of which ten were completed. In addition, improvements were carried out to four others. One small earth dam was constructed to provide water for the Coffee Research Station at Lyamungu.
- (g) *Tanga Region.* The construction of one earth dam was completed. Three gravity supplies were under construction, two of which were completed, and four pumped supplies from boreholes, two of which were completed. In addition, improvements and extensions were carried out to three water supplies. The construction of wells continued in Handeni District.
- (h) *Southern Region.* No new construction of water supplies was possible, due to lack of Local Authority Finance.
- (i) *Southern Highlands Region.* The improvement of springs continued in Mbeya District, and the construction of wells in Njombe and Chunya Districts.

70. *Government Minor Settlement Water Supplies.* Work commenced on two new water supplies for Pangani and Sanya Juu. Phase I of the Pangani water supply was almost completed, and a start made on Phase II. At Sanya Juu, the work was brought to a very advanced stage. Work also commenced on major improvements to Kiomboi water supply, where the source of water was changed from a dam to a borehole. At Igombe Dam, which is the source of water for Tabora Township, work was put in hand on major spillway improvements, consisting of the extension of the existing concrete falls, from 100 ft. in length to 240 ft. This work was found necessary as a result of unprecedented floods in early 1962.

IX.—IRRIGATION AND FLOOD CONTROL

71. Tanga Region continued as in the previous year to be the centre of the greatest demand for the development of village irrigation. The people in the highlands of the Pare and Usambara mountains have a tradition of irrigation practice and their keenness to obtain additional irrigated land to relieve the over-crowded conditions in the mountains will be assisted by Government in every way possible. The soundest and quickest development of irrigation will be obtained in those areas where the people are used to irrigation and show a desire to expand it.

72. The extensive floods of 1961 were followed in 1962 by floods of almost the same intensity, and protection and repair works started during the year, as a result of the previous year's depredations, were faced with further damage at the end of the year. It is a measure of the continuous improvement in design and construction of flood control works that further damage caused by the 1962 floods has been relatively small. During the year flood protection works continued at Mkundi River and Mlali Irrigation Scheme (both in Eastern Region), and work on flood protection dams at Dabalo, Hombolo and Buigiri (all in Central Region), continued. Works were in progress on irrigation schemes at Kitivo, Kalimawe, Mbarali, Kalenga, Ilonga, Mlali and Mbarika, as follows:—

Kitivo Irrigation Scheme. The main channel, started in 1961, was extended by 7,000 ft. to bring the full area of the scheme under command. This work completed the main distribution system and the local cultivators are now engaged in developing the area to its full extent of 1,000 acres.

Kalimawe Irrigation Scheme. Some 800 acres are now under cultivation below the high-level channel and there is an increased demand in the area for land commanded by the channel. A diversion bund on the high side of the main channel, with cross-drainage structures, protecting the channel from surface water runoff was completed during the year, and allowed general improvement in the maintenance of the channel itself. Kalimawe Dam filled during the year, and the large amount of water flowing to waste over the spillway has strengthened the demand for the dam to be raised by 5 ft. to store an extra 13,000 acre feet which could provide additional water in the dry season for another large area.



KITIVO IRRIGATION SCHEME

Irrigation Regulator in main Canal (viewed from Upstream)

Analysis has shown grass samples from Maruku to have a very low nutritive value. A series of manurial observation plots has been established to investigate the problem. Plans were made for more pasture trials to be carried out at Urambo.

PAPAIN

The industry is worth, on average, £100,000 to the Northern Region. But expenses are rising and an important problem is the establishment of the trees. An attempt is being made to eliminate male trees by crossing female trees with their hermaphrodite parents and continuing this process in association with a programme of selection for fruit yield and other desirable characters.

PYRETHRUM

Lines of work previously started at Njombe were kept going. But the sub-station at Igere was established and it was again possible to post a qualified officer to this work at the end of the year so a full programme will be under way in 1963. Selection is clearly the means of achieving the greatest potential improvement in yield of pyrethrins and will form the bulk of the work. In an irrigation experiment at Uwemba a large overall yield increase was almost entirely due to the greater flush at the end of the dry season.

In the Northern Region the selection and testing of promising clones continued. Cutting back in April-May appeared to be better than doing it in November but both treatments seemed to increase the number of insect damaged and dead plants. The performance of some Kenya hybrids in one trial was poor. It is hoped to acquire a small piece of land in this Region in 1963 so that the programme can be concentrated and expanded.

RICE

With the completion of a series of variety experiments at Mahiwa work on paddy has ceased for the present. In a hill rice spacing experiment at Mtopwa the highest yield came from $9'' \times 9''$ with either two or ten seeds per hole; though two seeds per hole at $6'' \times 6''$ was nearly as good.

SESAME

For the first time, over five years testing, Local out-yielded Morada at Nachingwea. At Suluti Morada was again very superior, giving ten times the yield of Local seed when both were planted early. Yields in the Eastern Region were poor and while Morada retained its superiority at Wami and Ilonga, the Local seed was again best at Duthumi. There was some confirmation from Ilonga of earlier Nachingwea work that the Local varieties have a wider optimum spacing than Morada. At all centres, where tested, time of planting data followed the pattern of previous years.

At Nachingwea F 5 material selected from F 4 bulk lines of Morada $\times$ Local and Venezuela 52 $\times$ Local crosses was put into preliminary trial. But selection also continued and nearly 8,000 line rows were grown during the season. The programme has reached the very interesting testing stage, with the prospect of some very good material showing up. Since it has by far the greatest potentiality of production improvement, effort has been concentrated on this programme with the non-shattering work being given a lower priority.

Seed of a large collection of Venezuelan varieties was received during the year and will be planted in 1963.

SISAL

Research on this crop is the responsibility of the Tanganyika Sisal Grower's Association and its results are normally published by them. It is only intended to note here data obtained by the full-time co-operation of a plant pathologist at Tengeru on the problem of the hybrid disease complex. Since limited trial issues of Hybrid 11648 were made to estates much of it has succumbed to so-called Zebra disease. This is a complex of leaf spotting, spike rotting and bole rotting. Much detailed work has now shown that all three symptoms can be caused by a *Phytophthora* species. Ordinary sisal can also be infected by this fungus in the laboratory but presumably has some field resistance of unknown mechanism. Attempts are being made to determine whether the causal agent is a new introduction, a new strain or long established and merely did not come to notice until the Hybrid planting provided a host. The matter is of relevance when considering the dangers to ordinary sisal. Some work is concerned with possible control measures but the outlook is not hopeful.

SOYA

The crop at Nachingwea suffered from a condition whose symptoms resembled the published symptoms of Bud Blight. But an extensive series of tests in co-operation with E.A.A.F.R.O. failed to transmit any virus infection onto differentials. Similarly numerous seed samples from plants heavily infected with the "condition" all produced perfectly healthy seedlings. It was therefore concluded that the symptoms were not due to an infective agent but were probably related to an abnormally high sucking insect population. Nevertheless yields were reduced and some experiments rendered failures.

The breeding programme is reaching its conclusion. Four hundred new varieties were tested in strain trials. HLS 219 and 11 H 55 F4/137, leading performers for the past three seasons, again did well.

A continuation of the blend trials showed little yield benefit but they provide an interesting study in natural selection. HLS 237 generally takes over from Light Speckled and MIS 28 EB but the process depends upon the proportions in the original blend. Further spacing trials again illustrated the importance of correct spacing within a population to realise maximum yields. Varying populations planted on the square give a parabolic yield-curve without the pronounced dips which occur in row plantings at close within-row spacings.

An extended series of variety trials were carried out away from Nachingwea. It is apparent that the Nachingwea material is very much more adaptable than had been imagined. Experiments at Ilonga, Wami and Suluti showed a general yield level of 1,500 lb. per acre. At Mtopwa the figure dropped to 900 lb. but results from Duthumi were poor with the best variety giving only 600 lb. per acre. Everywhere HLS varieties out-yielded their parents (Light Speckled and Hernon 237). HLS 147 and 223 were prominent at all sites. HLS 263 also performed well at Suluti and Mtopwa.

SUGAR CANE

The transfer of the variety collection to Ilonga is now complete. A further fifteen new canes were released from the East African Plant Quarantine Station and are now in open quarantine at Tengeru. The outbreak of smut (*Ustilago scitaminea*) at Arusha Chini has been contained but not eradicated.

SUNNHEMP

In response to an enquiry from the U.K. for unretted fibre a crop was grown in the Northern Region. There were harvesting and decorticating difficulties, and further work is to be done on a ten-acre plot planned for Tengeru in 1963. At a reported offer of £50-£60 per ton for topped unretted fibre the crop could be attractive.

TEA

The work done at Mufindi is under the control of and will be reported by the Tea Research Institute. But there is a preliminary programme under the control of this Division at Maruku in connection with projected tea developments in the Bukoba area.

Most of the work is in its early stages but there are clear indications of potash deficiency, and responses have been obtained from nitrogen especially when used in conjunction with mulching. Shade seems to reduce yield. In nursery work dung has given large growth responses.

TOBACCO

Flue-cured

Yields were very low both at Seatondale and Urambo. The only "early", (*as climatically* defined) planted tobacco was the first planting in the time of planting experiment at Seatondale and this suffered so severely from a heavy storm in its early days, that it never recovered. An apparent benefit of planting late can be explained by the fact that tobacco put out in late November and December almost failed due to the early heavy rain, while that put out in January had reasonable conditions and performed "normally" for crops planted at that time.

At Seatondale nitrogen (up to 44 lb. N per acre) increased returns. The size of response was not great due to the poor potential of the season but the effect is in line with expectations from previous work. In "wet" seasons nitrogen is beneficial but in "dry" ones it is not.

except for the earliest planted crops. Phosphate responses were also in accordance with expectations though again their magnitude was small. Potash applications again failed to evoke responses. Fertilizer responses at Urambo followed the usual pattern but they were of similar size to those at Seatondale.

Routine variety testing was stopped, since sufficient data are available to make recommendations from among available material. But one experiment was carried out at Seatondale to obtain comparative information on a new variety (Golden Cure) which had been introduced into the district. In comparison with Virginia Gold and White Gold the recorded performances of all three were similar. But the leaf qualities of the Virginia Gold and Golden Cure were poor. Golden Cure had a lower proportion of green grades but this emphasized its undesirable tendency to colour when unripe and thus possess all the characteristics of immaturity except a green colour.

Despite the low general levels, soil fumigants considerably raised yields wherever tested. It was notable, however, that untreated yields on rested land were better than treated yields after one and two tobacco crops. This confirms the previous year's work and emphasizes that soil fumigants (i.e. nematode control) are only one factor in tobacco culture. They are not a substitute for good soil condition maintained by sound farming.

Fire-cured

The planned programme at Suluti continued without alteration. The time of planting data followed the same pattern as described for the flue-cured trials—except that conditions were worse, with 72 inches of rain being recorded at Suluti. Nitrogen increased yields but phosphate and potash had little effect. As expected, nitrogen was more beneficial on new land than on the second year site. In the crop sequence experiment yields are falling in the continuous tobacco plots but in contradistinction to the previous season there was little difference between tobacco yields after maize, millet, cowpea and groundnuts.

WHEAT

Production in the Northern Region continued to rise. This can be attributed to the new set of varieties now available, both directly from their increased yield potential and because this and their wider adaptability has increased the popularity of the crop.

The programme of testing new introductions, selection and initial multiplication continued on its well planned way. Increasing interest by farmers in the use of fertilizers has given rise to plans for a number of trials in 1963. A number of seed lots were sent for testing in other potential production areas of the country, but few results were satisfactorily recorded owing to inadequate co-ordination. It is intended that the Botanist at Tengeru will in future have overall responsibility for wheat work in the country and that this will enable other areas to be adequately explored.

AGRICULTURAL ECONOMICS

It has previously been recognized that systems of farming require study to determine factually what these systems are, and how improved practices determined by research on various components of the system can be integrated into them. Attempts have been made to work on the last problem through trial management farms but these have not been very successful through uncertainty of precise aims and lack of a foundation upon which to base them.

During the year a study of coffee and banana farming in the Machame area of Moshi District was carried out and published by an economist kindly lent by U.S.A.I.D. The first survey carried out by our own economist at Ukiriguru was also completed and written up. The latter referred to the Bukumbi area of Sukumaland. Both studies were statistically based on sample surveys using the interview method to obtain information. Valuable preliminary information was obtained and experience gained to improve the collection of data in future work.

The trial management farm at Ukiriguru has been modified as a result of the data obtained from Bukumbi and the best known cultural practices applied to each crop. Early indications are that the unexpectedly high labour inputs noted in the survey are being confirmed by close recording of this farm.

The trial management farm at Ilonga is being run on the same lines but the "system" has had to be laid down as a result of local impressions rather than on factual data. Again relatively high labour inputs are recorded but it is being clearly demonstrated that the recommended cotton cultural practices can easily be absorbed into existing practice.

This work is in its infancy but has shown every indication of providing a real contribution to a hitherto neglected and vital subject.

LIBRARY

The Ministry library services are now under the formal control of the Research Division. The beneficial impact of a qualified librarian has continued to be felt though lack of ancillary staff has greatly hindered the general reorganization of the Headquarters library and in particular the cataloguing of stock. Accommodation has also been a difficulty but this will be overcome by the Ministry's move into new offices in 1963. There are approximately 11,000 volumes in stock at Headquarters and 157 journals are now received. The circulation of journals has been reorganized and decentralized to ensure that the most efficient use is made of them.

The four research centre libraries were maintained and it is generally intended that each will provide the main reference facilities for the regions they serve. Regional and District offices will retain only a small stock of standard reference books; 781 volumes were acquired for this purpose during the year, due to the generosity of the Rockefeller Foundation.

B. C. AKEHURST,
Director of Research



REPUBLIC OF TANGANYIKA

MINISTRY OF AGRICULTURE

Annual Report
of the
Training Division
1962

1964
PRINTED BY THE GOVERNMENT PRINTER
DAR ES SALAAM

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MINISTRY OF AGRICULTURE ANNUAL REPORT OF THE TRAINING DIVISION, 1962

INTRODUCTION

Prior to 1st July, each division in the Ministry was responsible for the training of its own staff. This side of the Ministry work was increasing rapidly particularly in the expansion of the training institutions, the plans for the Agricultural College and the development of Farm Institutes (later called Farmers' Training Centres). In the interests of unity of training within the Ministry, it was decided to form a new division called the Training Division under a Director of Training, responsible for staff training in Tanganyika and abroad, Farmers' Training Centres, and for publicity and propaganda. The division is also responsible for the Africanisation programme of the Ministry, nominations for courses at the Civil Service Training Centre, careers advice information and liaison with Universities and Higher Education Establishments.

There were several changes of names within the division during 1962:

The Natural Resources School, Tengeru became the Ministry of Agriculture Training Institute (Tengeru);

The Agricultural Training Centre (Ukiriguru) became the Ministry of Agriculture Training Institute (Ukiriguru);

Farm Institutes became Farmers' Training Centres;

The training school at the Water Development and Irrigation Division's Project Planning Centre became the Ubungu Training Institute.

MINISTRY OF AGRICULTURE TRAINING INSTITUTE, TENGERU

1. STAFF AND GENERAL.

The year was one of many changes; in approach to student instruction, curricula, practical training, and in the staff and farm. Despite these, progress was maintained and morale remained good. The policy of increasing emphasis on practical work was continued, with formal practical classes, long morning practicals once weekly on the farm, early morning and evening routine practicals and project work. This project work is an innovation, a student or small group of students are responsible for a particular job; they are not offered help but are encouraged to find out for themselves. The results of such project work are included in the final assessment of the student. Projects included animal rearing, simple farm building, carpentry and management of a vegetable plot.

2. TYPES OF INSTRUCTION.

Agriculture and Veterinary Courses.

A new syllabus was printed for the Agriculture and Veterinary Courses. These were designed with the first years very similar, and animal husbandry is equally emphasized in both courses. Extension methods are now taught and practical experience gained in contiguous parts of Meru Chiefdom.

Wives Course.

The course continued throughout the year, and 24 wives of second year students graduated in December. The nursery school, which caters for children whilst mothers are in class, was well employed, with 30 children from 6 months to 6 years.

Tsetse Course.

This first course for field officers (Tsetse) commenced in February/March with nine students. The study of basic biology was followed by topographical survey, preparation of maps, tsetse distribution, pupa searching and plant recognition. Long safaris were undertaken between June and October, and various tsetse fly species were studied.

Orientation.

Five Orientation Courses, (of which one was in Dar es Salaam) were held. These were 2nd/3rd Swahili and 1st/3rd background knowledge. New Swahili teaching notes were prepared. There were 109 participants.

English Background.

This Second English Background Course for Field Assistants was held in May/July. Twenty-one Field Assistants were enrolled on the course, but of such wide basic learning that only 15 were able to continue and sit the examination.

Bee-keeping.

The second bee-keeping course was held in August/September for 21 officers from Northern Rhodesia, Sudan, Uganda and Tanganyika. Teaching was done by a Bee-keeping Officer of the Bee-keeping Division of the Ministry of Lands, Forests and Wildlife.

Staff Training Course.

A ten-day course for Institute training staff was conducted by the Central Training Unit. Valuable help was derived in the methodology of practical group training.

3. INTAKE.

Students were selected from all regions.

The academic year started on 5th February and closed on 5th December with the following results:—

Class	Starting		Examinations					Left			
	No.		Passed		referred		Fail		Bursaries	Others	
Agriculture. I	85	...	45	...	22	...	7	...	9	...	2
Agriculture. II	48	...	27	...	5	...	2	...	11	...	3
Veterinary. I	21	...	12	...	1	...	1	...	7	...	—
Veterinary. II	33	...	33	...	—	...	—	...	—	...	—
Wives (1 year only)	...	24	...	24	...	—	...	—	...	...	—
Tsetse I	...	9	...	9	...	—	...	—	...	...	—

First year referred students entered second year, and re-sat failed subjects in February and March, 1963. Second year referred and failed students returned to the field prior to re-sitting in April and September.

Educational Background.

15 special entry Veterinary Students to Veterinary II Std. VIII.
19 form IV to Agriculture and 13 form IV to Veterinary Classes.
66 form II to Agriculture and 8 form II to Veterinary Classes.

Tsetse Students.

1 Form IV.
7 Form II.
1 Standard VII.

Final Results.

Agriculture	...	...	Passed in Class II	...	...	...	...	2
			Passed in Class III	...	...	...	...	25
			Referred	...	...	...	...	5
			Failed ...	...	...	...	...	2
Veterinary	...	...	Passed in Class II	...	...	...	...	5
			Passed in Class III	...	...	...	...	35
			Referred	...	...	...	...	—
			Failed ...	...	...	...	...	—

Graduating students were posted as follows:—

Veterinary Division ...	...	...	...	14
Research Division ...	...	...	...	13
Extension Division ...	...	...	...	24
Development Division ...	...	...	...	13
Training Division ...	...	...	...	1

4. LIFE OF THE INSTITUTION.

Throughout the year the health of the station was good and the health services well maintained. Conduct and discipline were very good. Several extra-curricular activities were maintained including a social club, football, a school magazine, lectures and excursions.

5. DEVELOPMENT.

The buildings to be erected under the development plan reached the stage of final drawings and bills of quantities.

There is now a well-stocked library of technical and non-technical books, many presented by the Ranfurly Library, Mrs. Marsh of Cheshire and U.S. A.I.D.

A catalogued collection of all visual aids was produced and stocks increased, particularly of film strips and wall charts. The museum was set up, a relief map of Tengeru made, and wall displays mounted. A living museum of 80 plots containing a cross section of Tanganyika crops was organized.

Farm Development.

The heart of an agricultural institution is its farm, and the development of sound farming methods was pursued as funds allowed.

The ring fence was completed and 200 acres were fenced and paddocked. A farm management committee was formed to co-ordinate the many farming and research interests.

Eighty-Seven acres were planted in December for a short rains crop, mostly maize and beans.

Livestock.

New Indo-african and Boran bulls were obtained, and the dairy herd showed an improvement over the year despite a setback due to Foot and Mouth Disease. The pig unit was increased to economic proportions. Culling was carried out amongst the goats and sheep, and some stud rams were stolen. The poultry unit increased its incubation facilities in order to supply outside orders for day-old chicks.

MINISTRY OF AGRICULTURE TRAINING INSTITUTE, UKIRIGURU

1. STAFF AND GENERAL.

This was a year of many changes and difficulties which the Institute weathered extremely well.

Accommodation was improved considerably by the completion of three large new buildings and modification of many old ones; two new types of course were commenced and there was a change in the main language of instruction from Swahili to English, at the same time as a substantial increase in the education level of the student intake.

2. TYPES OF INSTRUCTION.

Main Courses.

Course XXV, a one-year course for older staff of the former Department of Agriculture was completed in July.

Course XXIII a two-year course for staff of Standard VIII education who belonged to the former Department of Agriculture was completed in July.

Eight students of the first two year Fisheries Course held in conjunction with the Fisheries Training Centre, Mwanza completed the first year of their course in July (details under Fisheries Training).

Course XXVI, a two-year course for staff of the Extension Division who completed Standard VIII education continued throughout the year, having commenced in November, 1961.

The wives of a number of students in Course XXIII completed their one-year course in July.

Course XXVII, a two-year course for agricultural students of Standard XII education level commenced in November.

Course XXVIII, a three-month course in Crop Husbandry and allied subjects for former members of the Veterinary Department who have been transferred to the Extension Division commenced in November.

A number of wives of students in Course XXVI began their one-year course in November.

Other Courses.

A group of eighteen potential Honorary Inspectors of the T.S.P.C.A. accompanied by four members of their Headquarters staff organized a course at Ukiriguru from August 11th to August 24th.

Staff of the Training Division of the (then) Prime Minister's Office organized a 10-day course in training methods for members of staff and those of adjoining institutions in October.

3. INTAKE.

Students were selected from all parts of Tanganyika.

Total student numbers (including wives) during 1962 were 227

				No. of Students	Educational Background
Course XXV ...	...	...	...	48	Std. III to VII
Course XXIII ...	...	...	...	44	Std. VIII to X.
Fisheries Course ...	...	...	...	8	Std. VI to X.
Course XXVI ...	...	...	...	19 at begin- ning of year. 16 at end.	Std. VIII to X.
Course XXVII ...	...	...	...	41	Std. XII.
Course XXVIII ...	...	...	...	32	Std. V to X.

(c) Results obtained.

Course XXV ... 39 out of 48 students were awarded certificates.

Course XXIII ... 36 students were awarded certificates.
6 were required to resit certain subjects and were awarded certificates later.

2 students failed the examination.

Fisheries Course ... 7 students completed their first year satisfactorily.
1 student failed and left the course.

Course XXVI ... 17 students completed their first year satisfactorily.
2 students failed and left the course.

Wives of Course XXIII students ... All 23 wives received pass certificates.

4. THE LIFE OF THE INSTITUTION.

The re-organization of the new course for higher calibre students, with staff changes and shortages and certain equipment shortages, caused temporary difficulties which were overcome by hard work and co-operation. The shortage of books in the library was overcome by bequests from Tengeru, the Ranfurly Trust and the Rounce Memorial Fund. The Students' Union was running well at the end of the year and football was popular. Several extra-curricular activities were organized including football, debating, photography, tape-recording, excursions, singing and Red Cross groups.

STERILITY DISEASES.

Evidence of Infectious Bovine Cervico-Vaginitis and Epididymitis at two dairy farms in the Arusha District was so strong as to make desirable the imposition of quarantines and restrictions on the disposal of stock from those farms. Brucellosis surveys were completed in the Lake Region and instituted in the Northern Region. No cases of Vibriosis or Trichomoniasis were recorded.

THREE-DAY SICKNESS.

Was widely reported, spontaneous recovery invariably following a short illness.

TICK-BORNE DISEASES.

(i) *Anaplasmosis*.

Occurred sporadically throughout the country, but was more apparent in the Northern Region where there was a higher proportion of highly susceptible Grade dairy-cattle. In the Arusha District 137 successful treatments were given ("Mecryl" or oxytetracycline) and 705 head were protected by vaccination. Still in the Arusha District deaths in captive buck (Bushbuck, duiker, waterbuck) were attributed to anaplasmosis, such deaths ceasing when other animals at risk were vaccinated.

(ii) *East Coast Fever (T. parva)*.

Remained widespread and was the cause of high mortality in all enzootic areas. Only a small proportion of actual deaths attributable to this disease was reported, casualties in the enzootic areas being accepted as a matter of course.

(iii) *Heartwater (Rickettsia ruminantium)*.

Occurred sporadically with the true picture of incidence obscured by the difficulty of confirming microscopically clinical diagnosis in the field.

(iv) *Piroplasmiasis*.

Was recorded in cattle from all Regions and was commonly met in dogs. Again, figures reported gave little accurate information on true incidence.

TICK-BORNE DISEASE CONTROL.

Public interest in the control of tick-borne disease by dipping, spraying and hand-dressing was maintained. In the Arusha District three of the original Arusha Dipping Scheme dips (defunct since 1955) were repaired and re-opened by the efforts of local stock owners and a fourth was in process of repair. Two new dips were installed and opened in the Ngorongoro Conservation Area and in the Mbulu District all 25 dips functioned at full capacity except when closed for maintenance and repairs. In the Lake Region where 39 Local Authority and 9 Government dips operated total immersions (including dipping and spraying) amounted to 698,121, slightly fewer than in 1961 owing to the inability of Local Authorities to provide adequate funds for maintenance. Again, in the Central Region, immersions in the Kondoa District would have been far higher than the total of 344,000 had the Local Authority been able to provide funds for full maintenance. In the Western Region, dipping and spraying increased in popularity in all areas where tick-borne disease presented a problem and it was reported that the cattle population of Kahama District had increased by some 73,000 owing to the influx of stock from neighbouring non-dipping areas. Similarly in the Tanga Region tick control measures were intensified, with 8 dips operating in the Handeni District, a new dip installed at the Cattle and Coconuts Scheme at Mkinga, Tanga District, an old one resurrected at a similar scheme at Kibafuta in the same area. Four new pre-fabricated dips purchased from Development funds were earmarked for the extension of existing schemes in Tanga and Same Districts. It was regrettable that in the Southern Highlands, the scene of the highly successful but now defunct Iringa Dipping Scheme, public apathy and lack of co-operation rendered fruitless our attempts to get some sort of tick control scheme working again.

TRYPANOSOMIASIS.

With two-thirds of Tanganyika infested in varying degrees of density with one or more of the several species of Glossina it was not surprising that the incidence of trypanosomiasis remained high. Such incidence was not, however, as high as in the drought year of 1961 when recourse to fly-infested grazings was the only alternative to certain death from starvation. A rough indication of incidence was provided by the number of treatments with

Homidium ("Ethidium" or "Novidium") provided either free or on payment by Local Authorities during the year.

Region			Region			
Northern	...	...	38,840	Southern Highlands	3,506	
Lake	...	...	153,541	Tanga	...	51,054
Central	...	...	31,000	Eastern	...	5,762
Western	...	...	18,750	West Lake	...	6,311

It should be understood that many of the above treatments were given on clinical diagnosis by non-professional staff only. Microscopical diagnoses of bovine trypanosomiasis incriminated *T. congolense* in approximately 75 per cent of cases, *T. vivax* in approximately 23 per cent of cases and *T. brucei* in about 2 per cent of all cases.

Berenil was also employed to a limited extent curatively, whilst for Prophylaxis Prothidium and Antrycide Prosalt were used as circumstances dictated.

TUBERCULOSIS.

In the Southern Highlands localized bovine tuberculosis was frequently seen at the Mbeya abattoir in cattle invariably originating from the Usangu area. The tuberculin test was carried out at the Tanga Dairy and the few reactors in the herd of 1,000 head disposed of by slaughter. In the Dar es Salaam area, following the discovery of a generalized case of tuberculosis on the post-mortem of a milk cow at a local dairy, the testing of 512 head of dairy stock in 4 herds chosen at random showed 62 (12.13 per cent) positive reactors and 76 doubtfuls (14.85 per cent). Discussions with the Municipal Health Authorities regarding the possibility of setting up a central pasteurization plant had not, at the end of the year, borne fruit.

CLINICAL WORK

Clinical services were provided at all the major centres throughout the year, Dar es Salaam and Tanga enjoying the services of Government subsidized veterinary surgeons, whilst at Arusha, Iringa and Moshi much of the time of the Veterinary Officers was spent providing treatment and advice to the surrounding farming community. Clinical work of a limited nature was also performed at District Offices and at the many Veterinary Centres dotted around the country.

QUARANTINES

The quarantines on the Loliondo Division of Masailand for both Rinderpest and Contagious Bovine Pleuro-pneumonia remained in force throughout the year, as also did that imposed upon the Southern Highlands, Buha and the Ngara Districts for Rabies. Elsewhere in the country numerous quarantines were imposed and withdrawn from time to time, mainly for Foot and Mouth Disease, but also for East Coast Fever, Infectious Bovine Cervico-Vaginitis and Epididymitis, Tuberculosis and Newcastle Disease.

QUARANTINE STATIONS

In the Northern Region, routine maintenance work was carried out at the Temi and Makuyuni Quarantine Stations where we were fortunate to experience no grass fires of serious proportions. Shortage of funds prevented the envisaged development of the Shishuyu Holding Ground (Lake Region) into a full-scale Quarantine Station, but fair progress was made at the Lubaga Quarantine Station (also Lake Region) where the entire perimeter was double-fenced and part of the internal paddocking completed. Kindai Quarantine Station, near Singida was heavily flooded throughout much of the year and subsequent heavy weed growth overwhelmed large sections of previously open grazing.

ABATTOIRS AND MEAT INSPECTION

Meat inspection and the maintenance of abattoirs in the major Townships remained largely the responsibility of this Division, although some of the more progressive and enlightened Town Councils (Morogoro, Dodoma, Mbeya, Iringa, Njombe) assumed financial responsibility for the maintenance of buildings and ancillary structures and plant. In Morogoro and Mbeya meat inspection duties also were taken over by the Township

Health authorities. The new £36,000 abattoir serving Dar es Salaam was at last opened in May and, after initial teething pains, functioned satisfactorily throughout the year. It was thus possible to demolish the old abattoir which had somehow managed to serve the ever increasing population of Dar es Salaam since its completion by the Germans in 1908. Both Tanga and Tabora abattoirs remained the headaches they have always been, the former being unfortunately sited from the effluent disposal aspect, the latter an obsolete, dilapidated structure in dire need of demolition and replacement. Meat inspection was carried out by our staff at both the Tanganyika Packers Ltd. factories at Dar es Salaam and Arusha, at the T.A.C. Kongwa and wherever possible in the Minor Settlements and smaller villages. Condemnations, as before, were chiefly on account of cysticercosis, emaciation, fevered flesh and distomiasis, with localized tuberculosis found fairly frequently at Mbeya and Iringa.

STOCK MOVEMENT

Holding Grounds, Transit Camps and Stock Routes:

Little development of the 2,500 mile stock-route system traversing the country was possible during the year. One important improvement, however, was effected which should do much to alleviate the difficulties of northern Masailand stock destined for the Chagga (Kilimanjaro) meat market. This was the acquisition of Sassani Estate on the north of the Sanya Corridor for a Quarantine Station/Holding Ground and the double fencing of a stock-route traversing the Sanya Corridor from Tinga-Tinga in the north to Oldonyo Moruak in the south. Free access to Weru-Weru market was thus made possible without need for trespass on the farms of the Corridor or to make the long and weary detour to the west of the Mount Meru and Loljoro farming areas.

Elsewhere routine maintenance and upkeep was provided where required, minor improvements being added as funds and staff permitted.

IMPORTS OF LIVESTOCK

Animal imports from other countries are indicated in Tables 1 and 2 below. Table 1 provides figures of all imports other than those of slaughter stock. Table 2 shows known numbers of slaughter stock imported from Kenya into the Northern and Tanga Regions.

TABLE 1—IMPORTS OF ANIMALS 1957-62 BY COUNTRIES OF ORIGIN
(EXCLUDES IMPORTS OF SLAUGHTER STOCK)

Country of Origin	Bovines	Sheep and Goats	Pigs	Poultry	Caged Birds	Dogs	Cats	Equines	Others
Kenya	1,434	142	—	51,428	14	45	4	17	629
Uganda	282	—	—	100	8	—	—	—	—
Zanzibar	—	—	—	—	1	1	2	—	—
South Africa ...	—	—	—	—	—	3	—	—	—
C. A. Federation...	—	6	—	7,562	1	23	3	1	—
U.K.	—	—	—	9,014	4	13	1	—	6
Europe (Rest) ...	—	—	—	500	—	8	2	—	2
Asia	—	—	—	—	2	2	—	—	—
Other	12	—	—	1,550	206	4	3	—	14
1962	1,728	148	—	70,154	236	99*	15*	18	649
1961	6,233	537	107	69,117	94	82*	15*	2	49
1960	4,181	109	103	40,858	74	84*	5*	6	16
1959	3,245	114	129	54,088	59	85	10	35	15
1958	1,613	643	17	37,672	217	—	—	101	—
1957	1,530	41	8	16,983	351	240	31	413	—

*Does not include dogs and cats imported under open general permit from Kenya, Uganda and United Kingdom.

TABLE 2—IMPORT OF SLAUGHTER STOCK ON THE
HOOF FROM KENYA—1955-1962

YEAR	To: NORTHERN REGION		To: TANGA REGION	
	Cattle	Sheep and Goats	Cattle	Sheep and Goats
1962	14,884	964	689	7,830
1961	36,432	18,716	1,096	2,730
1960	27,293	14,952	671	1,300
1959	27,790	49,285	1,020	1,174
1958	32,511	14,701	473	2,941
1957	21,990	21,374	319	1,527
1956	13,905	9,000	—	—
1955	4,338	—	—	—

EXPORTS OF LIVESTOCK

Were as under, domestic pets and game animals not included.

To (Country)	Cattle	Sheep	Goats	Pigs	Poultry
Kenya	—	—	—	46	2,331
Congo	448	—	—	—	—
Zanzibar	1,505	1,155	7,395	—	—
Qatar	100	—	—	—	—

INTERNAL SLAUGHTER STOCK MOVEMENT

Table 3 below records the known movements of slaughter stock from producing Region to consuming Region. It does not include the movement of stock for traditional and social purposes.

TABLE 3—MOVEMENT OF SLAUGHTER CATTLE, 1962

From: REGION	To: REGIONS								Tanga- nyika Packers Ltd.
	Tanga	Eastern	Northern	Southern High- lands	Lake	West Lake	Central	Western	
Northern	6,196	—	—	—	—	—	8,491	—	22,344
Western	—	7,444	—	—	—	1,443	—	—	7,568
Central	4,605	30,017	6,267	—	6,830	—	—	1,849	13,475
Lake	—	—	596	—	—	51	—	—	10,441
West Lake	—	—	—	—	—	—	—	—	—
Eastern	—	—	—	—	—	—	—	—	4,730
Southern	—	—	—	—	—	—	—	—	—
Highlands	—	—	—	422	—	—	—	—	204
Tanga	—	—	—	—	—	—	—	—	—
Southern	—	—	—	—	—	—	—	—	26,656*
1962	10,801	37,561	6,863	422	6,830	1,494	8,491	1,849	85,418
1961	14,926	27,527	5,515	1,403	1,381	8,536	1,965	537	88,116
1960	15,328	21,239	3,948	1,723	540	9,333	1,601	1,759	91,161
1959	20,532	19,799	3,105	1,453	571	12,375	1,533	22	74,132
1958	21,586	14,752	3,527	1,651	137	—	37	130	49,889
1957	18,221	20,973	6,429	634	2,356	—	—	—	42,645
1956	23,568	32,805	11,392	320	1,251	—	—	—	48,722

*Sundry purchases.

CASTRATIONS

This service, usually provided by junior personnel armed with Burdizzo castrators maintained its popularity. The figures provided below indicate a small drop in numbers castrated consonant with the reduced staff available to perform the operation.

CASTRATIONS, 1962

Region	Cattle	Sheep	Goats	Pigs	Donkeys
Southern	169	10	136	14	—
Tanga	3,903	1,372	2,470	—	84
Central	36,738	10,110	15,200	—	392
Southern Highlands	12,401	1,159	2,159	—	37
Eastern	5,347	1,037	2,411	—	41
Lake	64,875	17,371	34,215	—	771
Northern	7,481	2,632	4,425	3	1,104
Western	33,994	4,035	9,170	21	10
West Lake	1,885	48	574	—	—
Total 1962 ...	116,793	37,774	70,760	38	2,439
Total 1961 ...	184,000	43,665	71,006	33	1,704

DEVELOPMENT SCHEME

Funds provided under the 1961-64 Three-Year Development Plan permitted the completion of the stock-route traversing the Sanya Corridor from north to south, the fencing of the Lubaga Quarantine Station, the purchasing and equipping of the five-ton mobile stock-route workshop lorries, the purchasing and equipping of three mobile laboratories (one for E.C.F. investigation, one for C.B.P.P. testing, one for general investigatory work) and the construction of five prefabricated sectional steel dip tanks.

Local schemes with which this Division was associated included the various coastal "Cattle and Coconuts" Schemes which consisted of the development and acceptance by coastal stock-owners of the concept first advocated by this Division in the late 1940's, of the mutually beneficial association of livestock grazing through coconut plantations; the establishment of a Masai controlled grazing scheme at Simanjoro under the aegis of the local Roman Catholic Mission; the resurrection of sections of the long defunct Arusha Dipping Scheme on a Self-Help basis; and assistance in the numerous improved poultry distribution and plough-oxen training schemes.

VETERINARY CENTRES

These sub-stations, usually consisting of a simple office-cum-laboratory with dwelling quarters for the Assistant Field Officer in charge were sited wherever possible at focal points of livestock interest, near markets, dips, astride stock-routes or near community centres. Their function was to act as outposts of the District Veterinary Office and to bring veterinary services closer to the livestock-owner in the field. The Assistant Field Officer was charged with the duty of getting out and about amongst his parishioners offering practical advice on and demonstration of simple improved husbandry methods and providing a disease intelligence, diagnostic and advisory service. As a rule the Centre buildings, their maintenance and supply of equipment and drugs were provided by the Local Authority while the officer-in-charge, his allowances and transport were the responsibility of Central Government. It is unnecessary to emphasise that the efficiency and value of each Centre depended very largely upon the calibre of the officer-in-charge and upon the ability of the Local Authority to provide funds adequate for its maintenance and servicing.

STAFF

The Division was grievously short of professional staff throughout the year. Out of an establishment of 29 Veterinary Officers and 6 Veterinary Research Officers only 14 Veterinary Officers and 2 Veterinary Research Officers were in post at the year's end. Of these six were absent for considerable periods on vacation leave. The situation was further exacerbated by the retirement of a number of expatriate Field Officers and by the transfer to other Divisions within the Ministry of many of our more senior and experienced sub-professional African staff. Reinforcements were limited to 3 newly recruited expatriate Veterinary Officers and 4 Makerere diplomates. 13 Tanganyikans were on courses of study for professional qualification in Australia, the U.K. and Denmark of whom 6 were Makerere diplomates chosen from within our ranks.

LIVESTOCK MARKETS

Cattle, Primary Sales.

Total sales at primary cattle markets amounted to 217,150 head, a decrease of 17,132 as compared to 1961 when an overall total of 234,282 head were sold. The average price rose from Shs. 158/- per head in 1961 to Shs. 165/50 in the current year. The 17,132 decrease was largely accounted for by reduced sales in the Northern, Lake and Tanga Regions.

Cattle, Immature Males, Sales

37,659 male immatures sold at an average price of Shs. 89/- per head, a decrease in total sales of some 4,600 as compared to 1961. Average prices increased by approximately Shs. 3/- per head.

Cattle, Immature Females, Sales.

There was a sharp rise in numbers of heifer sales, 18,835 being sold at an average price of Shs. 111/44 per head, as compared to 10,317 head averaging Shs. 124/48 in 1961.

Resale Markets.

Secondary markets, where cattle purchased at District primary markets were resold to butchers and traders supplying the major consuming areas were held at Temi (Arusha), Weru-Weru (Kilimanjaro), Korogwe, Bukoba, Tabora and Kakonko (Kibondo). On these markets a total of 51,229 head averaged Shs. 201/60.

Sheep and Goat Sales.

Sheep sales showed a drop of some 5,000 head, 22,745 selling at the steady average price of Shs. 28/-. Goat sales similarly declined, 76,831 averaging Shs. 23/- as compared to 1961 when 86,753 head averaged Shs. 23/90. (See page 16 for table).

VETERINARY RESEARCH

Organisation and Administration.

The lack of staff was made more acute by the absence on leave of various officers, and without the assistance of the experts assigned to Tanganyika by the Food and Agriculture Organization, the research and diagnostic division could not have functioned.

The work of the Laboratory at Mpwapwa was transferred to the new Central Veterinary Laboratory in Dar es Salaam at the end of August, thus severing a link between Veterinary Research and Mpwapwa which had existed for fifty years.

Dr. G. Smith (F.A.O. Veterinarian) was in charge of the Veterinary Research Laboratory, Mpwapwa, until the transfer to Dar es Salaam.

Mr. J. R. Millican (F.A.O. Laboratory Technologist) spent some time at the Arusha Veterinary Investigation Centre before being transferred to Dar es Salaam.

Dr. E. A. Mahlau (F.A.O. Veterinarian) spent six months at Mwanza and Arusha assisting with the re-organization of both Investigation Centres.

The three Veterinary Investigation Centres functioned throughout the year and buildings at Mpwapwa were adapted to form a Veterinary Investigation Centre but due to lack of staff, this could not be opened.

The Chief Veterinary Research Officer attended a Seminar on Tropical Veterinary Medicine in Western Germany from 8th April to 11th May and a Seminar on trypanosomiasis at Tororo, Uganda, in November, and was absent on leave from May until October.

The Assistant Chemist proceeded to the U.K. in September for further training, leaving the Chemical section without either a Chemist or Assistant Chemist.

One laboratory technician proceeded to the U.K. for further training, and one Technologist was recruited and posted to Dar es Salaam.

VETERINARY RESEARCH; Mpwapwa/Dar es Salaam Laboratory.

Sheep, Mineral/Helminth Trial, Njombe.

This trial, carried out at Njombe, Southern Highlands Region in conjunction with Messrs. Tanganyika Wattle Co. Ltd., Messrs. Aspro-Nicholas Ltd. and the local District Veterinary staff, on mineral feeding and helminth control of sheep was continued.

Four groups of sheep were used, one receiving no anthelmintic treatment and no mineral supplement (Group A), another Phenothiazine when advised by the Chief Veterinary Research Officer (Group C), (fortnightly worm-egg counts being carried out), the third received one Cobalt bullet and Phenothiazine as for the second group (Group B) and the final group received a standard mineral supplement and phenothiazine as for the second group (Group D). Lambs were added to the maternal group as they were born.

In the adult group, two treatments with Phenothiazine were necessary, the full mineral group maintained its greater weight over the cobalt bullet group, the Phenothiazine group and control group in that order, and more lambs were born in the full mineral group.

Group				Average Weight in lbs. 1/1/62	Average Weight in lbs. 31/12/62
A	...	...	...	46.6	49.5
B	...	...	...	50	53.1
C	...	...	...	51.2	50.1
D	...	...	...	52.6	54.5

Lambs required only one treatment with phenothiazine in February, 1962, when they were approximately six months old.

Group				Average Weight in lbs. 19/9/61	Average Weight in lbs. 31/12/62
A	...	...	...	6.5	46.75
B	...	...	...	7.75	50.25
C	...	...	...	7.25	43.25
D	...	...	...	10.75	54.5

The trial is continuing and will be written up for publication elsewhere.

ROUTINE DIAGNOSIS AND TESTING

Blood Slides.

A total of 1,132 slides were examined in addition to those from experimental projects.

Morbid Specimens.

The number of morbid specimens dealt with again dropped, 609 only being dealt with. This was mainly due to the move to Dar es Salaam when work was interrupted for two months.

Rabies.

Sixty-three cases of suspected rabies were dealt with and of these, 19 were diagnosed by histological means only, while a further 8 proved positive after biological examinations, the remainder were negative on both tests.

Histopathology.

Paraffin Blocks were prepared from 139 tissues, mostly from material submitted from the field.

Field Investigations.

These were again curtailed due to lack of staff. An outbreak of Rift Valley Fever in calves at Kongwa was dealt with by on the spot preparation of serum from adult cattle in the herd—this was inoculated into newborn calves.

Clinical Work.

Clinical cases were dealt with on the Veterinary Research Farm, Mpwapwa and the T.A.C. Ranch, Kongwa. Six cases of Johne's disease and three cases of East Coast Fever were diagnosed on the Research Farm.

Chemistry section.

With the departure of Mr. Naik, Assistant Chemist in September, this section was left with neither Chemist nor Assistant Chemist.

Suspensibility Tests on B.H.C. Wettable Powders.

A device to test the suspensibility of B.H.C. Wettable powders in the laboratory using 50-gallon drums was tried out in an attempt to obtain an arbitrary value of suspensibility to which all B.H.C. Wettable Powders should conform to qualify for use in dip. The test was not finalised and work on it continues.

Rate of Contamination of Dipwash.

An experiment to study the rate of contamination of dipwash was started with the object of assessing an approximate relationship between the number of head dipped and the increase in the dirt and chloride content of dipwash. It is continuing.

Mineral Deficiencies.

A mineral survey of pastures and soils of Mpwapwa District was undertaken soon after the long rains. Analysis of 32 pasture samples and 33 soil samples indicated the existence of a deficiency zone for phosphorus, two deficiency zones for calcium and a common deficiency zone for copper and cobalt. Various recommendations were made to try and counteract the deficiencies.

Blood Phosphorus Determination.

The experiments reported last year were repeated and the preliminary findings were confirmed showing that blood organic phosphorus did not break down in the presence of trichloroacetic acid for at least a month, thus simplifying sampling in the field.

Routine Analyses.

A total of 1,454 routine samples of dipwashes, feeding stuffs, milks, pastures, soils and toxicological analyses were examined, involving well over 5,000 separate analyses.

VETERINARY INVESTIGATION SERVICES

GENERAL.

The three Veterinary Investigation Centres at Arusha, Mwanza and Iringa functioned throughout the year and their activities expanded as more use was made of them by the Veterinary Field Service.

VETERINARY INVESTIGATION CENTRE, ARUSHA.

This centre had a very successful year but was somewhat disrupted by staff changes.

EAST COAST FEVER.

There was an increased incidence in this disease during the early part of the year and on investigation the cause appeared to be due to irregular and faulty dipping or spraying.

PARASITOLOGY.

The nematode *Tetrameres americana* was isolated from the proventriculus of a hen in the Arusha District. As this species is uncommon in East Africa a small survey was carried out and it was found that one in four fowls in the District were harbouring the parasite without showing clinical symptoms. It was also found in a Vulturine Guinea Fowl.

Many faecal samples from Elephants were examined and the *Strongylus* species were by far the most common type affecting these animals.

RIFT VALLEY FEVER.

The serum neutralization technique was used to confirm the diagnosis of this disease. In many cases where abortion had occurred in Mbulu, Rift Valley Fever was confirmed to be the cause.

INFERTILITY IN CATTLE.

Brucellosis: A Brucellosis survey was carried out using the serum agglutination test and the milk ring test. Some 1,200 sera were tested giving 10.7 per cent positives and 427 milks giving 30.0 per cent positives. The organism has been isolated in Guinea pigs and has proved to be *Brucella abortus*.

Infectious Bovine Cervico-vaginitis and Epididymitis: This disease was diagnosed on two farms in Oldonyo Sambu and efforts were made to transmit the disease to virgin heifers.

VIBRIO-FOETUS.

The mucus agglutination test was carried out on cases of suspected vibriosis but all results were negative.

JOHNE'S DISEASE.

At Marangu farm serum samples were taken and sent to the U.K. for the complement fixation test. The results showed five positive. A Johnin test carried out after the tuberculin test, 28 out of 77 showed a positive reaction to Avian tuberculin.

RINDERPEST.

Two suspected outbreaks of Rinderpest were investigated, neither outbreak being confirmed.

In conjunction with Mr. Plowright of E.A.V.R.O., a survey of Rinderpest Neutralising antibody in Game species of the Ngorongoro Conservation Area. The results obtained so far are given in Table 5.

From the information gained it became apparent that Rinderpest had been present in the area during the year but evidence of clinical cases was not forthcoming.

TABLE 5—RINDERPEST NEUTRALISING ANTIBODY IN GAME SPECIES OF THE NGORONGORO CONSERVATION AREA

LOCALITY	SPECIES	No.: POSITIVE/No.: TESTED IN GIVEN AGE GROUP					Totals
		Birth to 4 months	5—8 months	9—18 months	20—30 months	3 years or more	
Crater ...	Wildebeest ...	8/11	2/13	8/50	3/7	24/25	106
O1 Balbal ...	Wildebeest ...	40/52	3/10	48/78	26/37	66/76	253
Malanya...	Hartebeest ...	—	—	0/2	0/1	0/1	4
Ngorongoro Conservation Area ...	Thompson's Gazelle	0/2	0/11	2/19	3/23	*	55
	Grants Gazelle ...	—	0/2	0/14	0/6	0/3	25
	Eland ...	—	1/2	6/8	3/6	9/9	25

*= None tested.

BOVINE MALIGNANT CATARRH.

An experiment was carried out on the recovery of Bovine Malignant Catarrh virus from the blood of wildebeest in the Ngorongoro Conservation area in conjunction with Mr. Plowright of E.A.V.R.O., and the Ngorongoro Conservation Authority. The results to date are shown in Table 6.

TABLE 6—RECOVERY OF B.M.C. VIRUS FROM THE BLOOD OF WILDEBEEST
NUMBER POSITIVE/NUMBER TESTED IN GIVEN AGE GROUP

Birth to 4 months	5—8 months	9—18 months	20—30 months	3 years or more	Totals
16/54 ...	1/16 ...	3/104 ...	0/27 ...	0/78 ...	20/279
29.63% ...	6.25% ...	2.88% ...	0.0% ...	0.0% ...	

The results illustrate perfectly the decline in the percentage of positives with age.

ROUTINE DIAGNOSIS AND TESTING.

Blood Slides: A large number were submitted for examination. It was interesting to note that a high percentage of slides taken from Elephants were positive for *Babesia equi*. *Anaplasma marginale* was responsible for severe outbreaks of disease in cattle, often causing sudden death, most cases occurring in the rainy season.

Morbid Specimens: Some 600 samples were submitted for bacteriological, pathological or biological examination.

Post-mortem examinations: Post-mortem examinations were carried out on 51 farm animals with helminthiasis diagnosed as the greatest cause of death, 19 small and Game animals and 69 poultry.

Chemistry: 342 dip samples were analysed and 6 samples examined for toxic substances.

Field Investigations: 33 investigations into disease outbreaks were undertaken.

Visitors: Numerous visitors visited the station.

VETERINARY INVESTIGATION CENTRE, MWANZA.

General.

The activities of the Centre continued to expand in a satisfactory way. There were only two major staff changes—Mr. McCulloch replacing Mr. Hammond when the latter went on leave in August. Grass, trees and shrubs have been planted in the grounds and a rock garden established.

Regional Disease Survey.

This disease survey continued but rather fell away when field staff were transferred to other Divisions in July. Records of the survey have been plotted on large scale maps, and showed heavy incidences of East Coast Fever, Theileriasis, Babesiosis and reduced incidences of Anaplasmosis and Heartwater. In the East Lake Region, the highest incidences of trypanosomiasis were observed in Shinyanga, Geita and Musoma.

Helminthology.

Work on helminths was extended and experimental work carried out on four stations viz., Bungeji, Nyegezi, Butimba and Malya. The basis of the experimental work was dependant on fortnightly faecal egg counts, larval culture and identification, and it was planned so as to be in a position to advise strategic dosing with regard to climatic conditions.

In a small trial of Promintic using sheep and goats under a year old, it was shown that the immediate depressing effect of Phenothiazine on egg counts was greater than that of Promintic. This may have been due to the fact 80 per cent of the total worms were *Trichostrongylus* species.

At Kisesa near Mwanza, 80 cattle died of acute Fascioliasis and the outbreak was brought under control by the use of Fascol.

8 water bodies in Mwanza and Shinyanga District were examined for *Lymnea natalensis* and detailed monthly observations on the fluctuation of the snail population levels, infectivity rates and breeding times were carried on two water bodies near Mwanza.

Brucellosis.

A brucellosis survey was carried out using both the milk ring test and serum agglutination test. The milk ring test was used on 1,057 pooled milk samples and showed an infectivity rate of 13.5 per cent over the whole area surveyed.

503 serum samples from cattle, 73 from sheep and 75 goats were taken at Mwanza Abattoir. 15 per cent of those from cattle were positive, none from sheep and 1.3 per cent from goats. All these animals appeared clinically healthy at the time of slaughter.

The results have been written up for publication.

Blackquarter.

A small survey on the incidence of blackquarter in the region was initiated and from 17 samples of dried muscle, 11 isolates of *Clostridium chauvoei* and 1 of *Cl. septicum* have been made. These results indicate that clinical diagnosis of blackquarter in the field was of a high order.

Newcastle Disease.

A basic diagnostic unit for Newcastle Disease was set up and an outbreak confirmed at Tabora, and within a month Mwanza was affected. It became apparent that the disease was widespread in the area covered by this Centre.

ROUTINE DIAGNOSIS AND TESTING.

Blood Slides: A total of 838 slides were received in connection with the Regional Disease Survey and of these 135 showed *Trypanosoma congolense*, 31 *T. vivax*, 214 *Theileria parva* or Kochs Blue bodies, 75 *Theileria* spps. and 38 *Babesia* spps.

Bacteriology: 182 specimens were received for bacteriological examination and from these 51 gave bacteria of pathological significance.

Dip testing: 171 samples of dip washes were analysed, 45 showed a gamma B.H.C. of below 100 p.p.m. and 50 above 220 p.p.m.

Toxicology: 4 specimens were received for Arsenic testing, but were negative, and 3 specimens were tested for HCN, one being positive.

Post-mortem examinations: A total of 33 post-mortem examinations were carried out. VETERINARY INVESTIGATION CENTRE, IRINGA.

General.

This centre maintained steady progress, although staff changes inevitably upset routine.

Investigations.

The Iringa routine tick collection initiated after the closure of the compulsory dipping scheme was maintained.

Helminthology.

Severe losses in sheep and goats on riverine grazing were found to be due to heavy infestation with internal parasites. Worms recovered from the livers and blood vessels of the goats were identified by Dr. Dinnik of E.A.V.R.O. as *Schistosoma boyis*, and from the rumen of the sheep as *Paramphistomum microbothrium*. Both these species of Trematode develop through *Bulinus tropicus* which was very plentiful in the area. Control of the snail intermediate host was advised.

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TABLE 4—LIVESTOCK SALES BY REGIONS, 1962

REGION	YEAR	PRIMARY SALES		SECONDARY SALES		IMMATURE SALES		HEIFER SALES		GOAT SALES		SHEEP SALES	
		No. Sold	Av. price	No. Sold	Av. Price	No. Sold	Av. Price	No. Sold	Av. Price	No. Sold	Av. Price	No. Sold	Av. Price
Lake	1962	42,406	174/20	—	—	1,533	113/02	3,560	127/14	7,144	24/45	3,862	21/31
...	1961	49,147	167/75	—	—	2,594	95/17	2,496	188/55	12,154	22/41	5,142	20/18
Western	1962	24,091	144/03	6,747	166/05	6,530	89/89	3,265	122/11	7,811	19/19	1,191	17/32
...	1961	27,386	145/29	3,506	140/88	7,582	88/42	2,758	115/55	8,400	20/69	1,738	19/05
West Lake	1962	—	—	12,031	285/-	—	—	—	—	248	26/93	238	28/45
...	1961	—	—	10,704	279/04	—	—	—	—	287	31/30	351	28/54
Northern	1962	54,479	165/86	24,637	198/37	4,331	113/30	76	117/39	27,811	25/88	12,654	33/93
...	1961	63,343	133/10	28,520	172/25	5,136	92/17	94	118/01	32,926	24/60	13,230	33/03
Central	1962	63,742	160/06	—	—	18,334	85/34	10,754	105/58	30,334	24/89	4,075	21/69
...	1961	63,117	172/61	—	—	19,557	17/17	3,803	96/38	31,254	24/54	6,503	18/54
Southern Highlands	1962	14,982	159/90	—	—	5,682	99/58	904	106/51	117	21/44	59	19/79
...	1961	14,591	171/69	—	—	6,057	99/25	1,040	101/88	249	21/52	94	19/09
Tanga	1962	7,094	161/14	14,514	166/68	273	90/13	128	90/97	828	25/94	67	20/46
...	1961	9,609	151/62	19,943	159/14	706	98/95	112	88/44	839	24/65	128	23/75
Eastern	1962	8,423	213/20	—	—	542	84/50	86	88/45	917	19/46	456	18/61
...	1961	7,089	219/50	—	—	648	91/87	14	103/43	644	23/69	188	21/03
Southern	1962	—	—	—	—	—	—	—	—	—	—	—	—
...	1961	—	—	—	—	—	—	—	—	—	—	—	—
TOTALS	1962	215,217	164/62	57,929	204/66	37,225	92/73	18,863	111/92	75,210	24/57	22,602	28/25
...	1961	234,282	138/22	62,673	184/56	42,280	85/87	10,317	124/48	86,753	23/90	27,374	26/06
...	1960	232,635	186/16	60,342	218/30	34,269	104/20	11,532	133/90	78,180	26/17	27,486	29/94
...	1959	244,624	187/19	71,449	215/36	35,992	93/31	10,389	137/55	91,945	23/67	32,436	27/66
...	1958	224,605	169/82	75,591	224/39	50,822	82/75	8,498	123/38	95,441	23/01	38,857	29/35
...	1957	232,435	166/41	87,443	207/95	65,569	72/80	14,385	118/18	121,289	20/80	48,848	18/99
...	1956	260,512	132/02	102,871	182/62	81,829	64/30	See Immatures	149,903	17/17	—	68,569	13/47



REPUBLIC OF TANGANYIKA

MINISTRY OF AGRICULTURE

Annual Report
of the
Development Division
1962

1964
PRINTED BY THE GOVERNMENT PRINTER
DAR ES SALAAM

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REPUBLIC OF TANGANYIKA

MINISTRY OF AGRICULTURE

ANNUAL REPORT OF THE DEVELOPMENT DIVISION, 1962

SECTION I

INTRODUCTION

The Development Division came into being on the 1st July, 1962, and became responsible for ten different services, so different from each other that there is no one common factor between any two of the services, except that they each play a part in the development of the country. The planning and organisation of these services, listed below, was therefore not an easy task and the latter six months of 1962 has not been without its difficulties.

1. Land Planning and Settlement Schemes.
2. Tsetse fly control.
3. Fisheries.
4. Agricultural machinery testing and Mechanisation.
5. Hide Improvement.
6. Produce Inspection.
7. Development of African grown tea.
8. Bird Control.
9. Vermin Control.
10. Development of poultry industry.

A considerable amount of time was spent by staff at all levels in the preparation of projects and plans for irrigation, settlement and land usage schemes, mechanisation, tea development and similar projects. The assistance provided by a team of Food and Agriculture Organisation personnel has greatly facilitated progress in the sphere of planning.

In spite of the fact that the Division has only been in operation for 6 months it has been able to make a useful contribution to the activities of the Ministry as a whole.

SECTION II

THE LAND PLANNING SERVICE AND SETTLEMENT SCHEMES

The demands on the Land Planning Service during 1962 showed an appreciable increase over previous years, consequently detailed planning of many Schemes was of necessity curtailed. There has been sufficient work to keep fully engaged a staff many times the size of the existing service, however the number of experienced Land Planning Officers has not increased in proportion to the volume of work.

A full list of projects handled during 1962 is given in Appendix I to this Report. The most important work undertaken by the Land Planning Service was on the Mkata, Kilindi and Kipembawe Settlement Schemes, land use on the Elton Plateau and Ruanda Settlement Schemes, and irrigation reconnaissance surveys in Lake Region.

The Mkata Settlement was originally planned as an urban re-settlement scheme but towards the end of the year the Land Planning Officer, Ilonga, prepared plans after detailed topographical and land use survey for the development of the area as a gathered settlement on the lines of an Israel Moshav. Development of this project is still in progress and is being watched with considerable interest. In the Southern Highlands Region, two projects

were planned to absorb considerable numbers of repatriated Tanganyika nationals from South Africa and Rhodesia. Elton Plateau is proving to be one of the most difficult problems in settlement anywhere in the country. Pressure from the local people (Wawanji of Matamba) for accelerated settlement is such that the Land Planning Service were unable to provide the detailed planning required for such numbers.

At Sonjo in the Kilombero valley, the layout of eighty $\times$ 5 ac. holdings, construction of roads and conservation works was completed under extremely adverse weather conditions and Land Planning Training Centre staff and students are to be congratulated for their contribution to planning and survey work. At Ichonde unit demarcation only was undertaken; both schemes have been taken over by T.A.C. It was intended to establish a small area of rubber on the latter scheme; unfortunately suitable planting material, still on order, could not be obtained by the close of the year.

In the Western Zone the work of the Land Planning Service was seriously curtailed earlier in the year by excessive rains which made conditions almost impossible for survey work, and it was only from May onwards that work could proceed in accordance with the programme. Notwithstanding the posting of an additional Land Planning Officer to the Western Region, the vast area to be covered made supervision of surveys extremely difficult. On one occasion survey terms were operating some 600 miles apart. At Rulenge in Ngara District, West Lake Region, the settlement of Ruanda refugees became a full time operation for the Land Planning Service towards the end of the year. Land selection and demarcation was undertaken by Land Planning staff in conjunction with Extension Division staff, who were responsible for a farm plan. By the end of the year 10,000 acres had been surveyed, demarcated and settled.

The re-settlement of families from Kilimanjaro and Arusha Districts in the Kilindi area of Handeni District was undertaken at very short notice and some 70 settlers and their families had moved in by the close of the year before planning and demarcation of holdings were completed.

In addition to major surveys already discussed, a number of less detailed surveys were undertaken, four of which were in the neighbourhood of Dar es Salaam representing urban settlement areas.

Land Planning personnel attended conferences in July and November at the Land Planning Training Centre mainly to decide on priorities of work.

SECTION III

TSETSE FLY CONTROL

The Tsetse Fly Control Services were seriously affected during 1962 by financial stringency and only small sums of money could be made available for vital control measures. This is a matter of grave concern because the programme of reclamation has slowed down to such an extent that fly has reinfested cleared areas and, in some areas, there has been a noticeable increase in human trypanosomiasis which, in the Babati area, has reached epidemic proportions. In the interests of economy, in addition to technical considerations, the use of insecticides has been increased during the year. Dieldrin and Telodrin, the latter on an experimental basis, have been used and it is evident that this technique is proving to be the most rapid and most economical method of controlling animal trypanosomiasis.

A full list of projects handled during 1962 is given in Appendix II. In Northern Region the principal work has been concentrated in Mbulu in the Sangaiwe and Below-Rift farming areas. In the former area the problem of re-settling the Wambugwe people has been investigated; however a satisfactory solution is dependent on the provision of water supplies. In the Below-Rift farming areas farmers have been persuaded to fulfil the leasehold conditions to clear all infested vegetation; the conditions having been extended by a further year. The results of these measures have been fairly successful and in the Kiru Valley a compact area of some 35 miles is now free of fly. In Masai District there has been no control work; activities being confined to surveys. An ecological survey was carried out in the Ngasarai area with the object of promoting a rehabilitation scheme for the Masai. In Masai District the Mbuyuni Settlement Scheme for settlement of Waarusha has also been surveyed.

In Central Region it was disappointing to note that limited manpower was made available for tsetse eradication under the famine relief schemes. Furthermore, in one of the principal areas where tsetse clearing work has been carried out over a period on the Kinyasi Ridge,

few settlers have moved into the fertile land made free of fly. This has been the more surprising in view of the fact that the large Kisaki dam is full and the Chubi bore hole pump has been re-installed. It is considered that with the uncertain rainfall at Chubi the land will be more suitable for cattle ranching than arable farming.

In co-operation with Tropical Pesticides Research Institute, a large project involving the experimental use of insecticides (Dieldrin and Telodrin) was started in the former experimental block lying between Pahi and Chungai, and the Masange Mbuga. The area for reclamation is approximately 23 square miles. Spraying of Dieldrin was carried out in the northern part of the area and Telodrin in the south at three weekly intervals between July and January, 1963. An early assessment of results indicates a complete elimination of fly. At six shillings per acre the cost compares favourably with previous spraying operations but the difficulties of obtaining complete isolation of any block for similar treatment are considerable. In Manyoni District a survey of the Makasuku fly front line has shown a remarkable and natural recession of fly which has freed a considerable stretch of arable land. A turkish tobacco project is being developed to utilise the area.

In Singida District two surveys have been undertaken; one in connection with the proposed Urugu-Wembere ranching scheme. No progress has been made with this scheme since a piped water supply (estimated at £87,000) has not yet been installed.

In Western Region the extremely heavy rainfall and subsequent flooding in 1961/62 season caused a considerable decrease in fly infestation in breeding areas. In Kigoma, survey and spraying to control fly in the lake shore thicket continued. The Kibondo and Kasulu District Councils are to be commended on their ability to continue clearing and reclamation work from their own Treasuries. On the other hand it has been disappointing to note that the Kahama District Council ignored the recommendations made for dealing with local fly problems.

In West Lake Region the discriminative clearing scheme in the Kaisho-Sina-Kyerwa area was concluded by June. This has proved to be a successful scheme, largely dependent on ring-barking the main *Acacia spp.* supplemented by insecticide spraying, resulting in a fly free area some 15,000 acres. At Kitengule (Karagwe District) all efforts have been concentrated on developing the area as a cattle ranch. There has been close co-operation with the Prisons Department on this scheme.

SECTION IV

FISHERIES

There was a considerable expansion in the Fisheries Service during 1962 and direct coverage is now being given in all Regions except Northern and West Lake; the former with its limited fisheries interest is adequately controlled from Central Region, and the latter—less adequately—administered from Mwanza. The recruitment of a Fisheries Officer for research into dam fisheries problems (attached to the Research Division) was an important development.

The Division has been greatly assisted by the services of a resident FAO Fisheries Economist and by a visit from an FAO Fish Canning Technologist. The former has been concerned to a large extent with the FAO Economic and Marketing Survey of fisheries, conducted throughout the country by Divisional Fisheries staff. External aid is playing an increasingly important part in the development of the country's fisheries; an outstanding example of this being the generous gift of £8,000 by the Nordic Union for the purchase of boat building and refrigeration plant for the Mwanza Fisheries station. The Nordic Union are also providing a Norwegian Fisheries Technologist for two years to assist with training and development programmes.

SEA FISHERIES

The economic and marketing survey has amply demonstrated the low fishing effort on many sections of the coast. Many fishermen appear to be content to use their boats for only a few days each month. Although a considerable number of fishermen have made use of the Agricultural Credit Agency, principally for the purchase of outboard engines, improved nylon nets, and wire mesh for traps, it would appear that improved equipment, resulting in higher catching rates, enables the fisherman to spend less time on fishing. This situation stems partly from marketing problems but it has been remarkable to note that it exists even in areas where there are unsatisfied markets. Such an attitude is to be deplored, particularly in the light of the national campaign for increased productivity.

Undoubtedly a major obstacle to the development of sea fisheries lies in the tight control exercised by the African middlemen and market "buying rings". Vested interests which suppress supplies in order to maintain artificially high price levels neither benefit the fishermen nor the consumers. It is this aspect which is a major obstacle to the successful establishment of fishermen's marketing co-operatives, and there will be no solution to the problem until the co-operatives can find a way of marketing fish other than through the present "middlemen" organisation. The Tanga Town Council has taken the initiative in controlling such monopolies.

Extension work among sea fishermen has been mainly concentrated on improvements to fish processing and the mechanisation of existing craft with outboard engines. A portable kiln has been developed, capable of smoking several hundred pounds of fresh fish at a time, the final product being capable of preservation in good condition for up to a month and thus opening new markets for sea fish in inland areas. These kilns have been widely demonstrated in Tanga Region, and twelve are now installed in various villages. They also form the basis of a nation building scheme in Kilwa. A demonstration model of a coastal "ngalawa" (outrigger canoe) powered by an outboard motor is arousing interest in Tanga.

Increased attention is being shown by both local and overseas concerns in the supply of frozen crayfish and prawns. Expansion of the trade to profitable markets such as U.S.A. depends on the participation of an adequately financed overseas concern able to provide the necessary processing equipment and expertise to meet the very high quality standards demanded. In association with local fishermen, this project, on which negotiations have started, could be a valuable development.

To ensure orderly development of the prawn waters of the Rufiji Delta, it was necessary to declare this a controlled area. Two buyers were licensed to purchase during 1962 and between them they purchased approximately 80,000 lb. of prawns. The Greek-owned purse-seine unit operating from Dar es Salaam moved to Zanzibar during the year for business reasons. Although this unit demonstrated that reasonable catches of pelagic fish, especially sardines, could be obtained under expert fishing management, the owners were unable to make an economic return under the present marketing arrangements.

INLAND FISHERIES

The extremely heavy rains in 1962 severely affected inland fisheries, particularly on Lakes Victoria and Tanganyika where rising lake levels caused the loss of fishermen's camps and fishing beaches, and difficulties in drying or smoking catches. On the other hand, shallow basins such as Lakes Rukwa and Kitangiri have filled and fishing has improved.

Lake Victoria fishermen are estimated to have landed up to 25,000 tons of fish. Steadily increasing catches of the introduced *Tilapia zillii* and the re-appearance of the very large (up to 4½ lb.) *Tilapia esculenta* have been recorded. At the Mwanza station courses of training for Divisional staff and selected fishermen were held. Experimental work on fish processing and boat building was also carried out. The re-stocking programme was severely hampered by heavy rain damage to ponds near the lake shore. At Malya, however, the ponds were unaffected and provided stocking material for the lake and dams in Sukumaland.

On Lake Tanganyika the valuable *dagaa* industry had a reasonable year with an estimated production of 12,000 tons. Adverse climatic conditions affected drying operations. Prices tended to be depressed on account of the loss of the Burundi and Congo exports and a drop in exports to Northern Rhodesia caused by a prolonged strike on the Copper Belt. Improvements in the *dagaa* fishing have largely been confined to seeking methods of improving drying. The visit of the FAO Fish Canning Technologist for a four-month period to test the suitability of *dagaa* for canning proved the process to be a success, however this project awaits further investigations and a feasibility study into the economics of establishing a cannery.

There has been vigorous expansion of the fisheries on Lakes Rukwa and Kitangiri, production from the latter being well in excess of 2,000 tons. It is most desirable that marketing of production from these two lakes should be on a co-operative basis; unfortunately, however, the formation of co-operative societies appears to have been resisted, largely on the grounds that the majority are itinerant fishermen.

Elsewhere in the country, extension work has been concentrated on increasing supplies of freshwater fish, especially in Central Region where a policy of stocking all available waters has been followed, with the object of improving the people's diet. In this connection the development of family fish ponds in the western half of Southern Region has been particularly successful.

SECTION V

AGRICULTURAL MACHINERY TESTING AND MECHANISATION

The Tanganyika Agricultural Machinery Testing Unit at Tengeru continued its programme of testing and developing machinery of potential use to Tanganyika farmers. Improved housing and storage facilities, provided under the Three-Year Development Plan, made it possible to enlarge the programme carried out by this Unit.

Two major and three minor development projects were completed during the year. The two major projects included the development of a prototype small mobile sisal decorticator and a prototype ox-drawn toolbar. The former is of particular interest to the hedge sisal industry in Lake and Western Regions. Results of tests compare favourably with standard Raspidor machines but a period of further testing will be necessary before this equipment is made available. An important feature of the latter piece of equipment is a high arch toolbar to enable cultivations on ridged land; a number of implements have been successfully tested and the machine can be easily adapted as a form of farm transport. The minor developments included the manufacture of an ox-drawn triangular harrow, long beam conversions of standard mouldboard ploughs and improvements to ox-yokes, all suitable for local manufacture.

At Ukiriguru the field unit of T.A.M.T.U. has been more concerned in field evaluations of agricultural machinery. Extensive testing of the N.I.A.E. ox-drawn toolbar was carried out on a field scale during the entire cultivation season. Two major disadvantages became apparent; the first being that the fixed wheel setting of 4 feet was a recurring problem with variable row spacings. The other disadvantage concerned the lack of steerage; this latter being a serious problem when undertaking inter-row cultivations requiring some accuracy. Both of these problems received further attention at Tengeru where modifications were made. A further period of extensive testing will now be required.

Both farmers and non farmers have shown considerable interest in the acceleration of mechanisation in African farming. In Northern and Lake Regions there was an increase in the tractor population and it is estimated that a total 550-600 tractors are owned and operated by African farmers in Tanganyika. In the Lake Region the standard of tractor ploughing was very poor this year, and many farmers who hired tractors did not receive value for their money. Few ploughing contractors plough deeper than 2 or 3 inches and Extension staff are frequently called in to ensure that the area ploughed is correctly cultivated. In Northern Region the main criticism of the African tractor owner, with the major exception of the wheat farmers in Mbulu, is that they are inadequately equipped with ancillary equipment. There has been an increase in contract cultivation throughout the Region.

Negotiations for the supply of tractors and equipment were opened in March and continued to the end of the year without being concluded. The Yugoslav Government offered to supply some 300 tractors within a credit agreement; however it proved impossible to supply the particular make of tractor originally specified and it was therefore necessary to test alternative makes of tractor under local conditions.

The expansion of the use of ox-drawn equipment continues in areas where such equipment is already established and is spreading to new areas as a result of the establishment of animal training centres and a free gift of ox-ploughs from the Federal German Republic. It has been estimated that there are over 50,000 ox-ploughs in the Lake Region alone. North Mara has reached the stage that no farmer need use a hoe to till his land and a farmer unfortunate enough not to possess a plough can easily borrow one from his neighbour. This increase in tractor and ox-ploughing is detrimental to soil and water conservation measures in the Maswa and Shinyanga districts as little of the mechanically ploughed land is ever ridged. Credit Agency loans assisted many farmers in obtaining cultivators and ox-carts; the demand for the latter is now reported as exceeding the supply.

SECTION VI

HIDE IMPROVEMENT SERVICE

A disappointing feature of 1962 was that whereas the quantity of exported produce increased, excepting crocodile skins, the total value of the exports represented a decrease of approximately £64,000. The reasons for this decrease are complex but it is mainly the result of a fall off in quality. Exports from two of the largest areas of production in the country, Lake and Central Regions, have not found favour generally with the trade because

the fundamental structure of hides and skins has been of poor quality. This is possibly a reflection on the low standard of animal husbandry in the Regions concerned, combined with the effects of malnutrition, particularly in Central Region, largely caused by two years of continuous drought.

It is becoming increasingly difficult to sell inferior quality hides and skins on the world market. Hides and skins of poor fundamental structure cannot be rectified by processing methods. A considerable effort has been made during 1962 to build up the standard of the Hide Improvement Service, with improved teaching and propaganda methods for the handling of hides and skins, but it is most necessary these efforts run parallel with improved animal husbandry measures.

A further disappointing feature was the delay in moving produce to the coast for export in the final quarter of the year. Owing to the extensive movement of cotton and maize there was a shortage of rolling stock available and in order to meet outstanding contracts exporters were obliged to move an unusual quantity of produce from Lake Region by lake steamer to Kisumu and by Kenya railway to Mombasa. Records show that approximately 49 per cent of Tanganyika's hides and skins production was moved to Kenya for re-selection, baling and export from Mombasa.

The majority of hides exported were purchased by Italy, but it is probable that many of these found their way into other parts of Europe. Goatskins were purchased by buyers from the U.S.A. as well as from Europe and the U.K. Only small quantities of sheepskins were exported, again mainly to Italy. The demand for crocodile skins on the overseas market was so great that, for regular customers, contracts had to be made on a long term basis. Some skins found ready sales in U.S.A., Holland, Japan and Kenya but the majority went to France. As a conservation measure against the killing of small crocodiles, a tax on all raw crocodile skins was introduced from the 1st July. This appears to be having an effect because although there was a reduction in the number of skins exported the individual value per skin was proportionately higher than in previous years. Full details of qualities and values of exports appear at Appendix III.

There was significant reduction in the Himo Tannery production after 1961, as the following figures provided by the Management show:—

		1961		1962
Sole leather	...	287,219 lb.	...	151,295 lb.
Colour leather	...	12,986 lb.	...	17,061 lb.
Chrome leather	...	67,925 feet	...	41,677 feet
Lining leather	...	2,676 lb.	...	733 lb.
Total value	...	£45,378	...	£20,733

SECTION VII

PRODUCE INSPECTION

The produce inspection service at the ports of Dar es Salaam, Mtwara and Tanga continued throughout the year. Additional produce inspection facilities in the form of a house and office for Assistant Produce Inspectors were provided near Tarime on the Kenya border, Tunduma on the Northern Rhodesia border and at the ports of Kigoma, on Lake Tanganyika, Mtwara and Lindi. The Coffee Grading inspection service at Bukoba continued throughout the year. Elsewhere routine inspections of stores and go-downs in the control of *Trogoderma granarium* were vigorously carried out.

PORT INSPECTION SERVICE

In Dar es Salaam, with the limited staff of only two Inspectors, inspection work was concentrated at the port, leaving inspections at the Dhow Wharf and go-downs in the City as a second priority. All ships arriving at the port carrying bagged cargo were examined for trogoderma infestation and although none was discovered, several cargoes of spices, salt, dates, etc., from the Middle and Far East were fumigated as a precautionary measure. Similarly, inspection was made of export cargoes and several consignments were refused admission to the go-downs on the grounds that insect infestation was abnormally high. During the year a total of 342 ships were inspected and 84 cargoes fumigated.

In Tanga all ships carrying bagged cargo were similarly examined and, again, no evidence of trogoderma infestation was discovered. Inspections were also carried out on go-downs in the town with negative results.

COFFEE GRADING SERVICE, BUKOBA

A total of 9,769 tons of all grades of coffee, comprising 2,692 tons of Arabica and 7,077 tons of Robusta, were passed through the port of Bukoba and were inspected and graded by the Coffee Grader. In general the quality was an improvement on the 1961 crop.

SECTION VIII

DEVELOPMENT OF AFRICAN GROWN TEA

Good progress was made during 1962 in the development of African grown tea schemes. These schemes are located in 4 main areas; Western Usambara, and in Rungwe, Njombe and Bukoba Districts. The initial intention was that planting material in the form of stumps should be produced by Government and accordingly nurseries were opened in all areas during 1961. During 1962 this policy was changed in favour of purchasing tea stumps from existing commercial estates. The latter procedure was favoured because of the greater resources of experience and personnel of the estates concerned. In Bukoba, however, where there is no commercial estate, nursery production has continued and has been expanded.

During the year under review the planting programme has made an excellent start, as follows:—

	Acres
Western Usambara ...	80
Rungwe District (Ndala) ...	20
Njombe District (Lupembe) ...	74

Unfortunately the planting programme in Bukoba District was delayed and did not start until December. In general, it should be stated that agreements have been made with commercial estates in all areas except Bukoba for a continued annual supply of tea stumps.

It has been the keystone of the African grown tea schemes, which are mainly grouped in areas close to existing tea estates, that production of green leaf tea should be closely linked to the existing or potential factory capacity. Moreover, there is the overall consideration of potential markets for made tea, accordingly, all tea planting is controlled by licence and the growers have grouped themselves in Co-operative Societies obtaining credit for planting material, and the co-ordination of subsequent processing and marketing.

Applications by growers for admission to the schemes have continued to be processed by Tea Officers of the Division, together with the assistance and co-operation of Agricultural Extension Division Officers. Careful consideration is given by these officers to the suitability of the soil and location before planting can begin. In general, most plantings have proved to be very successful and such plantings have formed the best demonstration material to potential planters. With the exception of Bukoba District, where there was initially less interest shown, the enthusiasm has been such that by the close of the year applications for planting were beginning to exceed available planting material.

It had been envisaged that a commercial company would develop a nucleus estate in the Bukoba area which would form the focus for African tea development. During 1962, however, it became evident that commercial participation was unlikely to take place, in the meantime planting has been on a modest scale. It is not yet clear whether the local people are convinced that tea offers an attractive alternative to coffee; a factor which underlines the role of existing commercial companies in influencing peripheral development.

SECTION IX]

BIRD AND VERMIN CONTROL

The campaign against grain eating birds (mainly of the *Quelea* sp.) was continued during 1962 in the Northern and Central Regions. Operations were under the control of the Regional Agricultural Officer, Northern Region, with finance being provided by continuation of the C.D. & W. Scheme.

In the early part of the year operations in Northern Region were hampered by heavy rainfall but approximately 2,000 acres of breeding colonies were sprayed with parathion and it is estimated that 123 million *Quelea* sp. were destroyed. Later in the year, particularly on the long rain planted wheat in the Ol Molog area, bird concentrations were extremely heavy and seven aerial sprayings were carried out in addition to a number of "blow ups".

Operations were also conducted in the Central Region and action by spraying of nesting sites was taken during the period February to June.

The Vermin Control Service which consisted of the sole unit at Malva in Lake Region was expanded during 1962 under the Three-Year Development Plan; an additional unit being provided for Southern Region and, by the close of the year, arrangements were well forward for a further unit for West Lake Region.

The activities of the Vermin Control Unit in Lake Region were considerably increased; the unit operating throughout all districts of the Region, including East Lake. Operations have been mainly concentrated against monkeys, baboons and porcupine. The results, shown as approximately 2,800 baboon and monkey killed and over 8,000 porcupine lairs dealt with in addition to other small vermin, have been remarkably successful. There has been evidence that rats are becoming increasingly harmful, particularly in the period preceding and during the cotton harvest, and plans are in hand for meeting this new menace.

The Southern Region Vermin Control did not come into operation until November when they started work in Kilwa District.

SECTION X

DEVELOPMENT OF POULTRY INDUSTRY

The work of importing day-old chicks from Kenya, mainly Rhode Island Reds with some Black Australorps, has continued throughout the year; the chicks being reared at the poultry establishment, Temeke, to the 3-month stage before being dispatched to up-country units for completion of rearing and sale to small poultry farmers for improvement of their breeding stock.

There is considerable room for development and expansion of this service as considerable interest is being shown up-country, notably in Southern, Southern Highlands, Central and Northern Regions. A survey of poultry requirements has revealed an urgent need for improvement in the system of rearing birds at up-country units. There has been much disappointment in the number of mortalities amongst day-old chicks arriving in Dar es Salaam. This matter is receiving very close attention but, in the long term, thought is being given especially to the establishment of a hatchery in Dar es Salaam.

SECTION XI

STAFF

With the reorganisation of the Ministry and the formation of the Development Division on the 1st July, I became the first Director with Mr. A. McCallum as Assistant Director. During the latter's absence on vacation leave from August, Mr. C. A. Waldron, Project Planning Officer, undertook his duties. Other heads of sections were Mr. G. J. Lockley, Chief Fisheries Officer, Mr. J. G. Watterson, Chief Tsetse Officer, Mr. F. Lunt, Hide Examiner, Mr. D. Aziz, Poultry Officer. FAO staff attached to Headquarters were Mr. J. L. Dibbs, Fisheries Economist, Dr. T. H. Strong, Chief Planning Officer, and Mr. G. van Dijk, Tea Officer.

There were two additions to the Land Planning Service, Mr. B. Dawtrey, Field Officer, on first appointment, who was posted to the Southern Highlands Region, and Mr. D. W. Phillips, Field Officer, who transferred from the Extension Division and was posted to Western Region. The Fisheries Section senior staff was substantially increased by the arrival on first appointment of Mr. J. Kambona, Agricultural Officer, and Mr. D. C. Emerson, Field Officer; the former being posted to Central Region and the latter to Lake Region. Mr. M. Mitchell, Field Officer, also arrived on first appointment and was posted to the Southern Region. One Field Officer, Mr. P. E. Chaplin, was transferred from the Extension Division and posted to Eastern Region. The Hide Improvement Service was also substantially increased by the addition of three Field Officers on first appointment—Messrs. S. B. P. McCullagh, R. P. Marks and D. J. Massey, and the transfer from the Extension Division of Mr. R. C. Henshaw, Field Officer. Tea development staff was strengthened by the arrival of Mr. N. D. McIntyre, Field Officer, who was posted to Lupembe, Njombe District.

SECTION XII

CONCLUSION

I am most appreciative of the loyal support and conscientious work of all grades of staff throughout the period from the formation of the Division. There have been many difficult problems of organisation to surmount and I have been very pleased with the way they have been tackled. I also wish to record my appreciation of the co-operation and support the Division has received from other officers of Government, particularly in the Ministry of Agriculture and Regional Administration.

D. V. CHAMBERS,
Director of Development

LAND PLANNING SERVICE

LIST OF PROJECTS COMPLETED

1. CENTRAL ZONE (Eastern and Southern Highlands Regions):

- (i) Lukosi Irrigation Scheme ... Preliminary reconnaissance.
- (ii) Ichonde Settlement Scheme ... Vegetation and soil map of proposed settlement area and demarcation of plots.
- (iii) Mkata Settlement Scheme... Detailed planning for settlement.
- (iv) Malolo Irrigation Scheme ... Topographical Survey to improve irrigation lay-out.
- (v) Chunya District Settlements ... Detailed survey of two areas in vicinity of Kipembawe.
- (vi) Elton Plateau ... Survey of unit boundaries and conservation measures (1,400 acres completed).

2. SOUTHERN ZONE (Southern Region):

- (i) T.A.C. Farms 13 and 18, Nachingwea ... Topographical Survey; layout of soil conservation and settlement plan.
- (ii) Matagoros ... After preliminary survey, settlement in N. Matagoro Hills abandoned.
- (iii) Songea area ... Topographical survey Miyao Coffee sub-station and Saluti Sub-station Ngomat Seed Farm and M.A.N.C.I.U. Farm Ugano. On the latter two, conservation layout and land use map drawn up.
- (iv) T.Y.L. Farm, Litowa ... Topographical survey and land use plan.
- (v) Mbemkuru Valley, Lindi area ... Land Use Survey started.

3. NORTHERN ZONE (Northern, Central and Tanga Regions):

- (i) Upper Kitete area, Mbulu... Land use Survey. Plans now being revised.
- (ii) Arusha District ... Unit demarcation on alienated estates being returned to Wameru occupation.
- (iii) Pongwe Settlement, Tanga ... Topographical Survey and Land Use plan.
- (iv) Kilindi/Kimbe, Handeni ... Selection of suitable settlement area after preliminary survey.
- (v) Shume/Magamba Forest Reserve, Lushoto ... Survey work and development proposals formulated. Detailed land planning for 1,000 acres.
- (vi) Kitivo, Lushoto ... Detailed survey of soils and layout of small irrigation block.
- (vii) Gonja, Same ... Detailed topographical survey of land under command, proposed dam and irrigation channel.
- (viii) Coconut/Cattle Schemes, Tanga ... Maps of 3 schemes produced.
- (ix) C.R.S. Lyamungu ... Topographical survey in hand.
- (x) Hombolo Farmers Training Centre, Dodoma ... Topographical survey and map completed.

4. WESTERN ZONE (Lake, West Lake and Western Regions):

- (i) Igombe Dam, Tabora ... Detailed topographical survey.
- (ii) Malya Prison Farm ... Detailed topographical survey.
- (iii) Rwamkoma Settlement Area ... Detailed topographical survey.
- (iv) Bukumbi, Kikubiji and Kiliwi Settlements ... Detailed topographical survey.
- (v) Malya Farm Institute ... Detailed topographical survey.
- (vi) Nyegezi Mission and Kazima Blind School ... Detailed topographical survey and farm plans made.
- (vii) Katuma Settlement, Mpanda ... Detailed planning over 10,000 acres and demarcation of 558 holdings.
- (viii) Ruanda Refugee Scheme, Ngara ... Demarcation of 5,000 acres into 10 acre units proceeding.

TSETSE FLY CONTROL
LIST OF SURVEYS AND RECLAMATION PROJECTS

APPENDIX II

1. NORTHERN REGION:

- (a) *Mbulu District:*
 - (i) Sangaiwe area 3 fly rounds demarcated.
 - (ii) Below-Rift farms, Magugu and Yaida Tsetse surveys.
 - (iii) Basotu, Maghani and Ladja Tsetse surveys preceding nation-building settlement schemes.
 - (iv) Madege area Continuation of 1961 clearing work.
 - (v) Gatabalanga Clearing works to project a dam.
 - (vi) Udahaya Valley Cutting of a fly barrier.
- (b) *Masai District:*
 - (i) Ngaserai area... .. Ecological survey.
 - (ii) Mbuyuni Settlement Scheme Tsetse survey.
 - (iii) Lake Natron Sonjo area Tsetse survey.
- (c) *Arusha District:*
 - (i) Oljoro farm block Investigations into fly infestation.

2. CENTRAL REGION:

- (a) *Kondoa Irangi District:*
 - (i) Project No. 1, Kinyasi Ridge Clearing work.
 - (ii) Project No. 2, Block B/Pahi Spraying scheme Reclamation with experimental use of insecticides.
 - (iii) Project No. 3, Bubu valley/Mangoloma Resettlement of areas evacuated through sleeping sickness.
 - (iv) Project No. 4, Sandawe-fly front Maintenance of Farkwa game fence to prevent passage of game carrying fly down Bubu valley.
- (b) *Manyoni District:*
 - (i) Project No. 5, Zuboro/Mponde valley Tsetse survey.
 - (ii) Project No. 11, Makasuku fly front Tsetse survey.
- (c) *Singida District:*
 - (i) Project No. 6, Mangonyi/Maduma valley Routine fly rounds.
 - (ii) Project No. 7, West Singida fly front Tsetse surveys at Urugu-Wembere and Sepuka.
 - (iii) Project No. 8, Kidaru-Scarp/Duruma valley Tsetse survey.

3. WESTERN REGION:

- (a) *Kibondo District:*
 - (i) Nkoni Clearing work in the Kavumu-Ilabiro-Kasanda area.
- (b) *Kigoma District:*
 - (i) Lake shore Survey and spraying campaign.
- (c) *Mpanda District:*
 - (i) Katuma Settlement Tsetse survey.
- (d) *Tabora District:*
 - (i) Urambo Settlement area Advisory work with T.A.C. on spraying of cattle bomas and watering points. Aboricide experiments.
 - (ii) Ugalla River Game Controlled Area Investigation into Tsetse incidence.
- (e) *Nzega District:*
 - (i) Itumba area Survey and clearing work.
- (f) *Kasulu District:*
 - (i) North Kasulu area Clearing reclamation work.

4. WEST LAKE REGION:

- (a) *Ngara District:*
 - (i) Bugufi Spraying scheme concluded.
- (b) *Karagwe District:*
 - (i) Kaisho-Sina-Kyerwa scheme Discriminative clearing scheme completed.
 - (ii) Kitengule scheme Demarcation of fly rounds.

5. TANGA REGION:

(a) *Tanga District:*

(i) Livestock Experimental Farm Emergency clearing work.

(b) *Pare District:*

(i) Kamari Clearing work.

(c) *Lushoto District* Investigations on fly movement into the mountains.

APPENDIX III

EXPORT OF HIDES AND SKINS

Qualities and values of exports for 1962 are given below with figures for 1961 in brackets:—

	Lb.	Pieces	Value £
Hides Dried 	10,033,755 (11,173,107)	1,349,192 (1,332,966)	851,093 (929,873)
Hides Wet Salted 	3,394,892 (3,302,085)	88,889 (86,948)	131,544 (137,724)
Sheep Skins Dried... 	956,859 (952,457)	746,280 (766,691)	121,705 (118,361)
Goatskins Dried 	2,618,570 (2,917,870)	2,283,983 (1,941,684)	389,878 (351,906)
Glue stock 	6,682	—	117
Crocodile and Lizard Skins 	131,531 (210,881)	14,579 (20,160)	74,164 (105,417)
		Total	<u>£1,578,501</u>

Total values of exports for the years 1954 to 1962 were as under:—

Total Values	£
1962 	1,578,501
1961 	1,643,281
1960 	1,814,042
1959 	1,980,139
1958 	1,156,815
1957 	1,044,747
1956 	1,265,197
1955 	1,057,196
1954 	1,324,554



